

Radio Control

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34 Extreme
Mods!
p.62

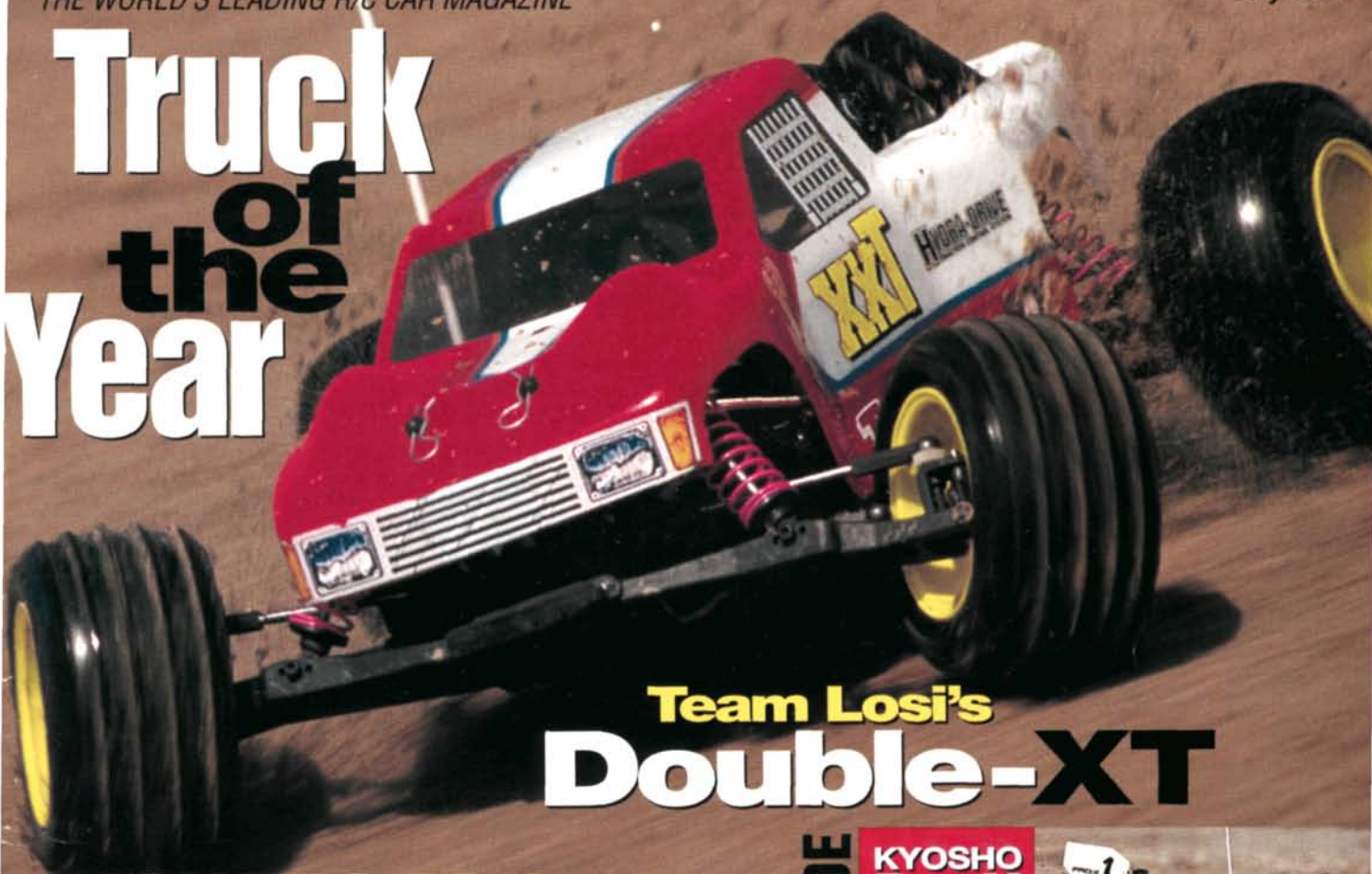


CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

July 1995

Truck of the Year



Team Losi's
Double-XT

**HOW TO Make
Wings & Spoilers**

RAGIN' RACING

Plus

▶ How local
racers
won big

▶ What's
new in
the pits



TESTED INSIDE

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ON THE COVER: photo by John Howell.

This page: photo by Rick Schwartz.

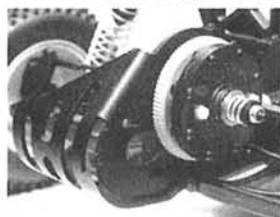
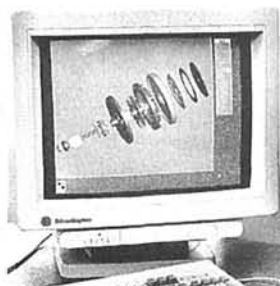
Engage, Mister Data!

TODAY, it seems that everything is done with the help of computers. They spit money out at you from holes in the walls; they enable you to talk to people across the world through online services such as Internet and America Online; and they're used to design and manufacture automobiles, electronics and other high-tech items. There's no doubt that computers enhance the quality of our lives and add to the safety and enjoyment of many activities. In general, products designed with the aid of computers are stronger, lighter and more efficient.

Computers play a large role in our beloved hobby, too. Microprocessors are used to add custom programming features to radios, and that allows them to have multi-model memory and special trim functions. The smooth, efficient throttle response of electronic speed controls can also be credited to our friend the microchip. Most battery chargers use tiny computers to monitor cell voltage and charge current to ensure maximum capacity and to lessen the chance of dangerous overcharging. Also, the significant improvement in R/C car and truck performance and durability is directly related to the use of computer-aided design.

For example, let's take a look at our chosen Truck of the Year—Team Losi's Double-XT (see feature in this issue). It was designed from the ground up with the help of Team Losi's monstrous Silicon Graphics work station, which incorporates a three-dimensional modeling software package. With this system, engineers can "build" 3-D models of parts on the computer screen and can simulate the actual movement of assemblies to check geometry and clearance. Using sophisticated stress analysis, parts are designed to be as strong as possible while being made of as little material as possible. With software such as this, an entire model can be designed, constructed and assembled on the screen without making a single mold or piece of tooling—very efficient.

Computer technology is here to stay, and we've only begun to realize the nearly limitless potential of these electronic brains. As more manufacturers take advantage of design software, we'll see transmitters with even more functions and ever greater range and signal clarity, "smarter" chargers that will extract even more performance from batteries, and—the seemingly impossible—stronger and lighter models



From pixel to product to pounding.

John Howell

We want to hear from you!

Write, fax, or e-mail us over the Internet: Car Action, Air Age Publishing, 251 Danbury Rd., Wilton, CT 06897; fax: (203) 762-9803; e-mail: Chris Chianelli—chrisc@airage.com; John Howell (Doog)—johnh@airage.com; John Huber—jhuber@airage.com; Frank Masi—frankm@airage.com.

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LETTERS

Errata: in "What's New" (May 1995), we printed incorrect dimensions for Schumacher's front and rear three-spoke wheels. The correct dimensions are: front—2.15x0.75 inches; rear—2.2x1.375 inches. We apologize for any inconvenience this may have caused.

GOTTA GET TRUCKIN'

Your magazine is tops, and without it, I don't know where I'd be in the world of R/C. Do you know of any 1/10-scale monster trucks that are affordable, fun to drive and have long run times with a standard pack? Also, does the Traxxas Nitro Street (RTR) come with a pull-starter or a glow plug, and does it require a starter box? Thanks for helping, and keep up the good work!

KEVIN MURRAY
Brooklyn, NY

Well, Kevin, check out a few of these monster trucks: MRC's MT-10M, the Traxxas Stampede,

Kyosho's Tracker and USA-1, and Tamiya's Super Blackfoot and Bullhead. The Kyosho USA-1 and Tamiya Bullhead are huge, 1/10-scale, car-crushing-type monster trucks, whereas the others are slightly smaller and have smaller monster-truck tires. All provide pretty decent run times.

As for the Traxxas Nitro Street (RTR), the only things you'll need are fuel and batteries for your receiver pack and transmitter. Everything else is included in the kit (even the glow plug). Also, you don't need a starter box, the engine comes with a pull-starter.

Doogie

WIDE RECEIVER

I own an Outrage, and I've been thinking that if I use Velcro®-brand fastener on the bottom of my receiver, I could use it in more than one vehicle; but I would have to thread the antenna through the

antenna tube every time I switched cars. Is there a way to use the antenna without the tube? I also think it would be cool if you did a head-to-head comparison of the USA-1 and the Clod Buster. Great mag!

ADAM DIELSCHNEIDER
Beaman, IA

Well Adam, here's what you do to solve your dilemma.

1. Take a 5-inch strip of 1-inch-wide Lexan.
2. About 1 inch in from one end of the strip, bend the Lexan up to an angle of between 45 and 90 degrees.
3. Poke at least six holes along both sides of the Lexan strip (ignoring the 1-inch bent section).
4. Glue Velcro® to the bottom of the bent end.
5. Now run the receiver's antenna through the holes in the strip.

Now that your receiver and antenna are both mounted with Velcro®, it will be easier to remove the receiver and antenna holder at the same time and put them into other cars.

As for your other question, stay tuned! We plan to revisit the USA-1 and the Bullhead (which is essentially a Clod with a different body) in an upcoming head-to-head feature comparison.

Doogie

LOW RIDER WANTS TO BE A HIGH RIDER

I own an RC10LS. The car is a screamer, and its handling is outstanding! But I have a problem: I race in parking lots, and I'm stationed in Guam with the Navy. Needless to say, this small island lacks the smooth parking lots of the good old USA. I understand the car is designed for the racetrack, but I don't have that luxury. The car is closer to the ground than most reptiles. How do I get some clearance for parking-lot fender-to-fender racing? Your magazine is a great publication, and I would greatly appreciate a reply.

GMG3 RONN E. SUTTON
Santa Rita, Guam

Man, Ronn, you've got it made. I actually had the good fortune to visit Guam once. What a killer place! Anyway, check elsewhere in this issue for Doug Mertes' article on his Extreme 10L. There, you'll

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July: Annual U.S. Nationals, OH

August: Annual Western Ohio Truck Pull, OH

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LETTERS

see how he converted his old 10L into the ultimate parking-lot machine. His tips and setups should get you pointed in the right direction. Good luck. What am I saying? You don't need luck, you're in paradise! Take it easy.
Doogie

WHAT IS THE ESSENCE OF SPEED?

After racing for almost 10 years and reading your magazine for almost that long, I still see you insisting that the motor is the essence of speed. Although fast motors are important for speed, if my chassis setup is off, all the speed in the world will not win the race. I race in one of the fastest and most competitive classes—pan-car NASCAR. Over the years, we have developed or helped to develop, new chassis, new motor setups, new equipment and new driving styles; but even with all this new knowledge and trick stuff, we will not win if our chassis setup is off. My point is this: no matter which type of racing you're into, you need to know your chassis geometry or you'll lose.

RON OVERLAY
West Milton, OH

Ron, you're totally correct. You have to know your car inside and out to get it set up correctly. Proper motor selection is, in fact, only one very important aspect of tuning your car, but it isn't the only thing to attend to. If your car isn't set up properly, no motor in the world will help you to win a race. I don't think we've ever argued otherwise, though. Motor selection happens to be a confusing subject (we're asked about it quite frequently), so we discuss it often.
Doogie

GETTIN' A GASEOUS BIRD

You guys have the best magazine. I especially like the color photos and helpful insights into the world of R/C cars and trucks. Anyway, I want to know whether the Traxxas Nitro Hawk is a good nitro truck for a beginner. Can a CZ-R fit in a Nitro Hawk? This would be my first nitro-powered truck, so I want to pick a good one. Your help would be greatly appreciated.

ANDREW MURPHY,
San Diego, CA

The Traxxas Nitro Hawk is definitely a good first-time gas truck, Andrew, and there's a conversion kit that allows you to run the O.S. CZ-R. Newer Nitro Hawk kits come with an improved engine—the TRX-12—so be sure to pick up one with that engine in it. Also, I'd run the engine that comes with the kit. According to Traxxas, this new engine is on a level with the CZ-R, so you might want to run it for a while and save a few bucks in the meantime.

Doogie

LAP LOGIC

We've built our own off-road R/C track to run our 1/10-scale gas cars, but we're having trouble with the lap counting. How can we count laps without an expensive electronic lap counter? Any ideas would be greatly appreciated.

BILL LONGENECKER JR.
Kempton, PA

There are a few ways to set up a lap-counting system. I used to go to a track that used simple counters. Each person gets a counter marked with a number that corresponds to a car on the track. As that car passes the start/finish line, the person with the counter gives it a click. This system works well, but you do need one person for each car on the track. Your next option is a set of Kyosho Lap-Boy counters. A Lap-Boy sensor is mounted on each car and points toward the ground. As a car passes a reflective strip on the track, the unit counts a lap. After a race, the information can be displayed on the Lap-Boy display module, or it can be printed out. Compare the results to decide the winner.
John

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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Stacey Granelli: staceyg@airage.com.

GOING PATRIOTIC

Ken Postage of Greenville, SC, sends this photo of his Bolink Legend. It has been modified with ball bearings and is powered by a Legend motor. Ken uses a Futaba FF-148 steering servo, a Futaba Magnum sport radio and a Futaba MC 210CB ESC. He says he races it whenever he gets a chance.



R/C ART 101

This hot ride comes from Joey Carlson of Puyallup, WA. His LXT is equipped with a Futaba Magnum Jr. radio, a 410-M5 ESC, a Green Machine 2, Trinity batteries, a Double-X tranny, a Hydra Drive and MIP CVDs. The Dahm's Slammer XL body was air-brushed by Joey, who submitted the truck as an end-of-the-semester project and entered it in the school art show. Hope you got an "A," Joey.

BIGFOOT CHALLENGES BIG TRUCK

This photo comes from Keith Williams of New Milford, CT. He modified his USA-1 electric truck by cutting it in half and making an aluminum frame to lengthen the wheel-base. It features full bearings, gold shocks, two 9301 servos and a Parma Bigfoot body. The stock motors are controlled by a Novak Rooster ESC and are powered by a Trinity D-cell pack. Keith says that the truck handles "great," and he'll put it up against John Howell's Project Big Truck any day. Sounds like a challenge, Keith. Give us a call!



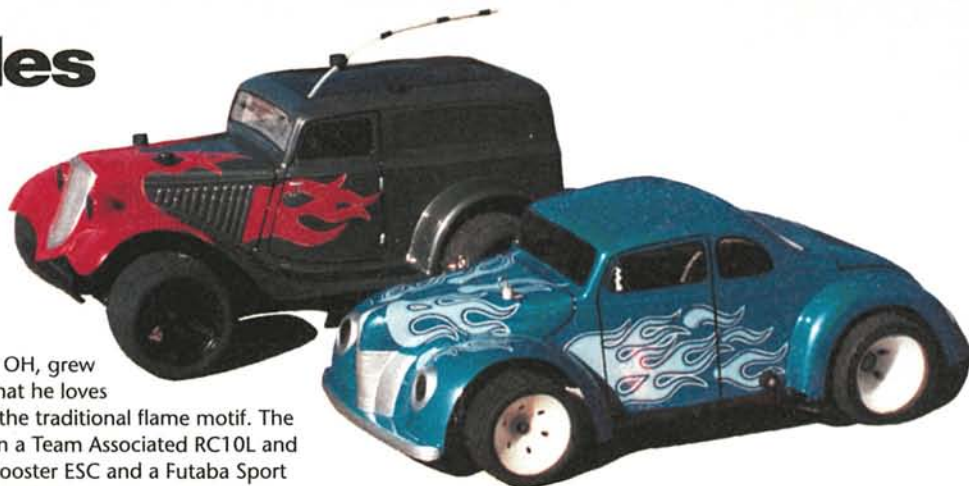
"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fourth annual "Reader's Ride of the Year Contest" in the fall of 1995. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



SANDSTORM SURVIVOR

The only survivor of this Rowland Heights, CA, sandstorm was Dustin Tatsumi's RC10T. Dustin has modified his truck with: Trinity purple-anodized screw set; RPM mini bumper and gear case; 64-pitch, 120-tooth spur gear; MIP CVDs; Deans Ultra Plugs; and Pro-Line tires. Power is provided to the Kinwald 12-turn modified motor by Trinity Race Tech cells. This speed demon is controlled by a Tekin TSC G-12 and an Airtronics XL2P. Hope it doesn't have to face a mudslide, Dustin.

READERS' rides



FLAME LOVER

Harry Crespo of Granville, OH, grew up in the fifties and says that he loves to paint his hot rods with the traditional flame motif. The '40 Ford coupe is based on a Team Associated RC10L and is controlled by a Novak Rooster ESC and a Futaba Sport radio. The '34 Ford Sedan Del sits on a Tamiya Stadium Blitzler, which is all stock except for the street tires, and is controlled by a Futaba Magnum Jr. Great job, Harry.



FROM A NUMBER-ONE FAN

Dustin Barron of Lakeside, CA, claims to be the Chargers' greatest fan. He even painted his Protoform Thunderbird body in their honor. The body sits on an RC10L SS graphite chassis, and it's powered by a Matrix 24. He uses a Tekin 412P2 ESC and an Airtronics Rival 2P radio to control his ride. Short of the Chargers' winning the Super Bowl, Dustin tells us that having his car in "Readers' Rides" would be the best way to celebrate the last football season.

SITTIN' ON THE DOCK OF THE BAY

Jason Kronenwetter of Sarasota, FL, was working at a full-size Mitsubishi dealership when Tamiya introduced the R/C version of the Mitsubishi Pajero. Jason has detailed his R/C after its full-size counterpart: an Adriatic Blue paint job; lights all around with lenses made out of real taillight covers; a vinyl spare-tire cover; and scale dealership tags and V6 emblem. He has added many hop-ups including: super-sealed, stainless ball bearings; felt dust shields for the propeller shaft; a Speedworks 427 4WD modified motor; and Pro-Line Road Hawg tires.



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INSIDE scoop



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Attention all 1/12-scale car racers! Hot Bodies is pleased to announce that they now offer all the current '95 NASCAR bodies in 1/12-scale body size. Yes, that's right!—the Pontiac Grand Prix, Chevrolet Monte Carlo and the Ford T-Bird.

These '95 versions will fit chassis in all popular brands and lengths, and they're marked with trim lines that help to eliminate all the guesswork. Approved by ROAR and NORRCA, the bodies come with an add-on spoiler and are available in light-weight and regular versions and are listed at \$14.95. For more info, contact Hot Bodies at (609) 893-7716; fax (609) 893-BODY.



Parking-Lot Power

Is your parking-lot pal lacking a little oomph in the power department? If it is, check out this motor from Paragon Racing. The Eclipse bushing modified motor is just the thing for your parking-lot car—especially if you race in Tamiya's parking-lot racing series. That's right, it's Tamiya-legal because it comes with bushings instead of bearings. The Eclipse is available in four winds—14, 15, 17 and 23. Its features include a 1.3mm-thick can, as well as a comm and brush configuration of standard size. The icing on the cake is the motor's low retail price of \$28. Similar bearing versions, which retail for \$50, are available in 13, 15 and 19 turns, but they aren't legal for Tamiya's parking-lot races. Contact Paragon Racing at (612) 442-6364 or fax them at (612) 442-6368.



Powerful Pipes

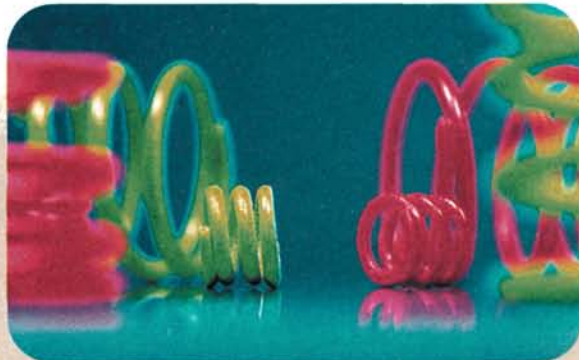


You and your buddy are racing your gas trucks, neck and neck, out on the track. You're running the same trucks, same fuel and same engines. Suddenly, he starts to pull away from you. "Wait a minute," you say to yourself, "Isn't this the guy I've been beating for the past couple of weeks?" You pull off the track and ask his secret. "It's all in the pipe," he replies.

Yes, folks—that's right; tuned pipes are the key to producing horsepower. If you're looking to add a little power to your gas car or truck, check out these new pipes from Slimline Mfg. Machined out of 6061 T-6 aluminum, the three-piece pipes have an inner cone, and each has been polished brightly enough to blind your competitors as you speed past them.

Slimline tuned pipes are available for the Associated RC10GT, Traxxas Nitro Hawk and Kyosho Outlaw Rampage Pro, and they fit O.S. CZ-Rs with and without pull-starters. The pipes and headers are available individually (\$34.99—pipe; \$18.99—header), and in a kit (\$54.99) that includes all the necessary hardware. For more info, contact Slimline Mfg. at (602) 967-5053; fax (602) 967-5030.

HPI now offers a complete selection of optional springs for their Super F1 cars and the Street Machine/Road Star kits. The springs are available in sizes of wire that make them softer or stiffer than the stock kit springs. This allows racers to fine-tune their cars to a variety of track conditions. To help prevent them from getting mixed up in your pit box, the springs are color-coded. Their list prices run from \$3.50 to \$4.50, according to which type of spring you choose: front, rear, or rear shock. For more info, contact HPI: (714) 837-3250; fax (714) 837-3251.



SPRING Thing

INSIDE scoop

HPI Tricks Out Your TA02



Looking to give your Tamiya TA02 4WD or FWD sedan that extra edge? Well, the good folks over at HPI have come up with another innovative hop-up item for your Tamiya cars. This new graphite/nylon molded chassis is much stiffer and lighter than the stock Tamiya chassis, and a fiberglass upper stiffener increases the unit's structural rigidity. With the HPI chassis, the batteries are now placed in an in-line position (instead of side to side) that provides a faster steering response. The chassis is easily bolted on and all the hardware you need to complete the conversion is included. Editors John Howell and John Huber have been hitting the local parking lots with their decked-out HPI 4WDs, and they report that they're "Too cool!!" So if you're ready to spice up your Tamiya sedan, check out this chassis. Contact HPI at (714) 837-3250; fax (714) 837-3251.

NEWS



BRIEFS

Horizon Does "Baywatch"

Matt Gilmore, Horizon Hobby's marketing publicist, is seen here behind the scenes at a recent taping of a "Baywatch" episode. Matt, who bears a remarkable resemblance to the show's star—David Hasselhoff—was used as a stunt double during a scene in which Hasselhoff's character starts to drown in the raging surf when he conks himself on the head with his rescue buoy. Matt, who once doubled for Hasselhoff on the popular



show "Knight Rider," put in such a stirring performance that the "Baywatch" crew asked him back to double for the season's final show. In that episode, Hasselhoff's character will get blown up when he tries to rescue costar Pamela Anderson from

a flaming Jet Ski®. Stay tuned for more of Gilmore's crazy TV antics.

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(908) 862-1705 • Fax (908) 862-6875



Birthday Bash

This year, the Florida Winterchamps were held on the same weekend as Associated Electrics owner Gene Hustung's birthday—February 26. Gene, who coincidentally shares his birthday with another R/C notable—Masami Hirosaka—had a mini birthday bash snuck up on him by his son Curtis. Earlier during the event, Gene had a great birthday present when Rick Hohwart piloted one of Associated's newest trucks—the RC10T2—to the TQ position in the Modified Truck A-Main! Congrats Gene, and belated happy birthday.

Kinwaldo At Large

Arnold—I mean Kinwald—oops! Brian Schwarze...what? This photo aptly illustrates the lighter side of shooting the Team Losi/Trinity "Dirtinator" ad, which you can see elsewhere in this issue. It was really a stretch for the happy-go-lucky Brian Kinwald to portray the tongue-in-cheek Dirtinator. Apparently, though prompted to "Look tough," Brian was sweltering inside those leather duds as he sat on Leo Gasaway's black Harley. Needless to say, his laughing eyes had to be hidden behind sunglasses.



Now, Adhere This!

Upscale Graphics—a new after-market decal company—introduces the latest addition to its line of R/C racing decals. Designed to fit 1/10-scale narrow stock and Indycar bodies, the fully licensed and approved Concours Edition graphics accurately replicate those used by racing teams on their full-scale cars. And this is just the beginning! Upscale Graphics introduces new products almost weekly. For a complete list of their hot offerings, send an SASE to Upscale Graphics, 3419 Via Lido, Ste. 385, Newport Beach, CA 92663.

Kinwald Delivers Power And Precision.

Team Kinwald brings you new ways to go fast. The BuggyWald™ off-road modified motor delivers heavyweight performance on a lightweight budget. And, Kinwald "Hard Ones"™ hardened steel pinions turn out precision and long life like no other.

Epic "EZ Flow"™
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Can

High Performance
Brushes and
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Double
Machine
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Adjustable
Timing

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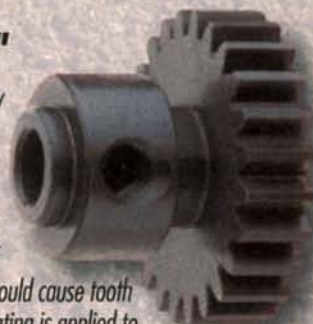
"If my first Modified Motors had been this fast, I'd been World Champion a lot sooner."

— Brian Kinwald
Current IFMAR World Champion



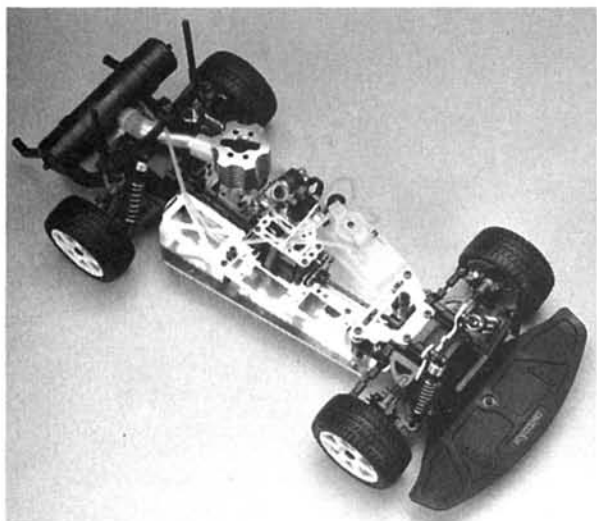
The "Hard Ones"

Team Kinwald brings you the new "Hard Ones" off-road steel pinions. With a Zero Gravity™ design, each pinion is case hardened to a 58-62 Rockwell C hardness to a consistent depth of .0010". Only total destruction would cause tooth deformity. Last, a black oxide coating is applied to prevent rust prior to use. Kinwald "Hard Ones" are the longest lasting pinions available. In 48 pitch only, 12 - 27 tooth sizes. Only \$4.99.



TEAM KINWALD BY TRINITY®

1901 E. Linden Avenue, #8, Linden, NJ 07036 ■ 908.862.1705 ■ Fax 908.862.6875



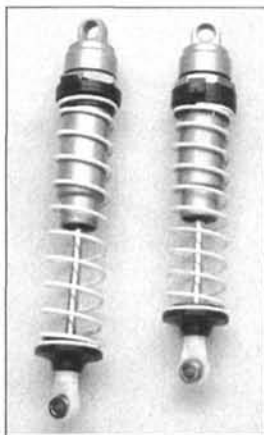
KYOSHO

1/8-Scale Esprit 4WD Chassis Kit

Based on Inferno 1/8-scale nitro engineering, this new chassis provides on-road enthusiasts with the same speed, power and convenience that Inferno drivers enjoy off-road. The Esprit 4WD features: a narrow track; a wide, deep, resin front bumper; a cooling-fan unit; a dual-exhaust composite muffler; six-spoke wheels and pneumatic, radial-pattern, on-road tires; a 125cc flip-top fuel tank; adjustable, dual disk brakes; oil shocks; and much more! Four optional body sets are available.

Part no.—KYOC0527; price—\$499.99.

Kyosho/Great Planes Model Distributors,
P.O. Box 9021, Champaign, IL 61826-9021;
(217) 398-3630; fax (217) 398-0008.



TRAXXAS

Big Bore Shocks

These shocks provide the ultimate damping control for the Rustler and the Stampede. They feature: large cylinders for greater oil capacity; special piston heads to reduce internal surface contact and friction; and clip-on spring adjusters for setting the ride height quickly and easily. The hard-anodized, Teflon™-coated T-6 aluminum is super-smooth and long-lasting.

Part nos.—2659 (medium), 2660 (long), 2662 (extra-extra long); price—\$34.

Traxxas Corp., 12150 Shiloh Rd.
#120, Dallas, TX 75228; (214) 613-3300; fax (214) 613-3599.

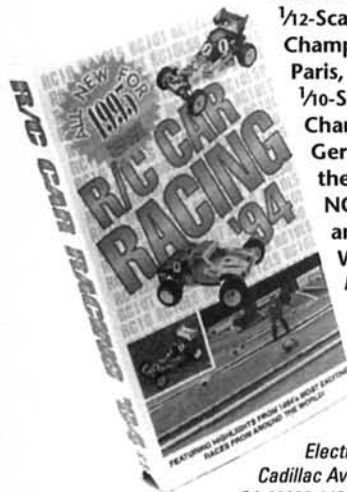
ASSOCIATED R/C Car Racing '94 Video

The ground-breaking, you-are-there video series continues with this new release. This approximately 2-hour video features unforgettable moments from the most important races of 1994—the Reedy International Race of Champions, the ROAR Off-Road and Truck Nationals, the IFMAR

1/12-Scale World Championships in Paris, the IFMAR 1/10-Scale World Championships in Germany and the first ever NORCA Electric and Gas Truck World Cup.

Part nos.—6976 (VHS format), 6976P (international PAL format); price—\$19.95.

Associated
Electrics Inc., 3585
Cadillac Ave., Costa Mesa,
CA 92626-1403; (714) 850-9342;
fax (714) 850-1744.



BRP Super Machine II Front End

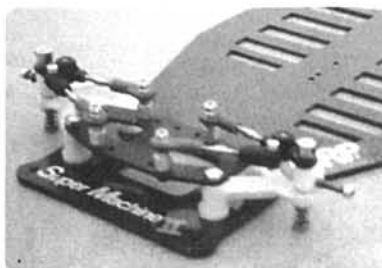
This ultimate, fully adjustable, easily maintained front end is designed to fit the

Associated 10L-

SS, Hyperdrive and any other chassis that has the same front-end spacing. It features: adjustable, heavy-duty, titanium upper rods; two progressive-rate springs (with different tensions) on special kingpins with O-ring damping; and 4-40 mini-locknut stub axles.

Part no.—5526; price—\$59.95.

BRP Inc., 1575 Lowell St., Dept. RCCA, Elyria, OH 44035; (216) 284-0270; fax (216) 284-0271.



ASSOCIATED RC10T2

This new electric truck kit moves trucks to the next level of R/C performance. It features: a new 2024 alloy, hard-anodized aluminum chassis; 2.6:1 reduction Stealth transmission with Associated Torque Control; stronger and lighter suspension arms; and much, much more! In its first race (at the ROAR truck nationals), the prototype TQ'ed in both stock and modified classes; it was also the fastest truck at the '95 Florida Winter Championships. Let Associated take you to the winners' circle!

Part no.—7076; price—not available at press time.

Associated Electrics Inc., 3585
Cadillac Ave., Costa Mesa, CA
92626-1403; (714) 850-9342; fax
(714) 850-1744.





CHICAGO MODEL INTERNATIONAL Power Station Charger

Model 811 is a 5A AC/DC charger that can charge, discharge and trickle-charge any 1200mAh to 1700mAh battery. This charger features: 6- or 7-cell select; Tamiya/Kyosho connectors; two-way universal output posts with hardware; input jacks for an external 12V power source; "light bright" monitors; a weather-resistant foil label charging chart for quick reference. It's very reliable and is supported by a five-year defects and performance warranty.

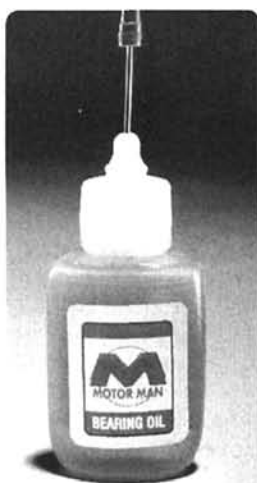
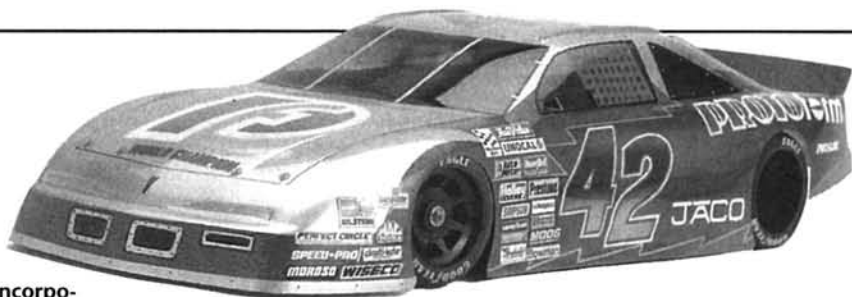
Part no.—811; price—\$39.95.
Chicago Model Intl., 611
Rockland Rd., Ste. 1, Lake Bluff,
IL 60044; (708) 735-8500; fax
(708) 735-8516.

PROTOFORM 1995 Grand Prix SS

This all-new body incorporates the latest changes that were made to its full-size "big brother" on the racing circuit. The 1/10-scale Grand Prix SS features a more aggressive front end and rear-deck lid for added downforce. It's available in two weights and includes an add-on spoiler.

Part nos.—1208L, 1208R; price—\$19.95.

Protoform, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.



MOTOR MAN Bearing Oil

This oil was specially formulated for R/C motor, wheel and diff bearings. Simply put a few drops on each bearing and watch their smooth-as-silk spinning action.

Part no.—MM1301; price—\$3.
Motor Man, 8950 Osage Ave.,
Sacramento, CA 95828; (916)
381-7491.

GLOBAL HOBBY DISTRIBUTORS Magnum High Torque Starter

This 12V starter will handle any engine of up to .65-size. It features: a high-power, compact, 12V DC motor with high-impact, anti-roll fiberglass and nylon endbells; an aluminum starter cone with V-belt groove and natural-rubber insert; a long, heavy-duty electrical cord; and chrome-plated battery clamps. The on/off switch is positive action and features an anti-slip surface. It's also available in the Deluxe model, which can handle engines of up to 1.08.

Part nos. and prices—361006 (12V starter), \$38.95; 361022 (Deluxe 12V starter), \$49.95.

Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728-8610; (714) 963-0133; fax (714) 962-6452.



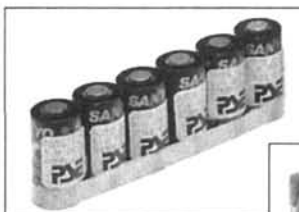
PSE R.T. Pro Batteries

This new system of cycling and matching Ni-Cd batteries ensures maximum run time, voltage and consistency. These 1700 SCRC batteries are available in 20A discharge numbers (guaranteed to be no lower than 350 seconds) and are available in three popular configurations.

Part nos. and prices—97806 (6-cell stick pack), \$74.50;

97805 (6-cell saddle pack), \$85; 97802 (6-cell loose), \$82.

Parma International/PSE,
13927 Progress Pkwy., North
Royalton, OH 44133; (216) 237-
8650; fax (216) 237-6333.



JAPAN R/C IMPORTS Change Bones for the RC10

Imported from Kose, Japan, these two-piece universal drive shafts are stronger and lighter than single-piece universals.

The axle is made out of hardened, tempered steel, and the bone is made out of hardened, tempered aluminum. The blue-anodized bone is available separately and can be easily removed from the axle and replaced if it's damaged in a collision.

Part nos. and prices—K-0803 (complete assembly), \$38; K-8202 (replacement bone), \$9/pair.

Japan R/C Imports, P.O. Box 7009-152, Lafayette, CA 94549; phone/fax
(510) 284-5778.





TRUBLE SHOOTING

by John Huber

DON'T FORGET YOUR SLIPPER

Concerning "Help, I'm Melting!" ("Trouble-shooting," March '95): I, too, have had this problem with the GT. If the slipper clutch is tightened too much, and you come off a jump with the gas on, or get hit the wrong way, the idler gear will come up as the weak link in the drive train. It appears to have melted, but it's just stripped. The



people at Associated tell me that the slipper clutch on the GT should be set not to slip on a hard acceleration, but no tighter, so that it can slip under stress. I was having so much trouble with the idler gear because I was running 40-percent nitro. This forced me to tighten up the clutch even more to prevent slippage on acceleration, which

caused it to be less forgiving on the jumps. **RANDY JACKMAN**
Alberta, Canada

Thanks for the help, Randy. This is a possible solution that I just didn't think of at the time. I still think that bearings would help in the tranny, but adjusting the slipper properly is very important.

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.



MODS TOO MUCH?

I own an Outlaw Rampage Pro. My friend owns an Outlaw Rampage, and his can beat mine. Why? I modified my truck with a .21 RX-B O.S. engine and an Airtronics Caliber 3P. I put Snake Oil in all the bearings. I have one-piece wheels and a Top 053 pipe, and I altered the

head to a liquid-cooled head.

BRENT WARWEG

Brent, I can't believe what I'm hearing. You put a .21 engine in a Rampage? What were you thinking? I can see that you wanted to beat your friend's truck, but a .21 is going a

little overboard! I bet half your problem is trying to get the traction you need to get the truck up to speed. There's no way that you'll get traction with that engine in there. And why are you using a liquid-cooled head? What

liquid are you using for cooling? My suggestion: rebuild the truck as it's supposed to be built—with an air-cooled .12 engine. And stick to the factory suggestions on the suspension setup: they know what they're doing. Then, you should be able to race your friend on a level playing field.

RC10T TIPS

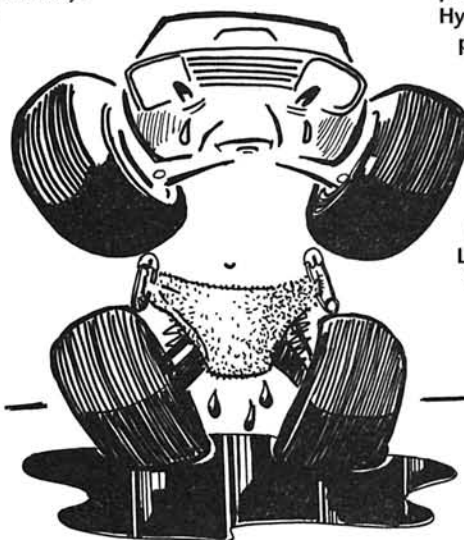
Recently, I bought a slightly used RC10T team truck, and I have a few questions. Why do my front shocks leak? I bought a rebuild kit but I don't know how to do it. It didn't come with any instructions, and I don't know of any hobby shops nearby. What will a rear spoiler and an underwing do on a truck body? I've seen them on almost all truck bodies. What would a Hydra Drive and a telescopic drive system do? I've had so much trouble with this truck. Could you list some good hop-up items to get it up to speed?

Great magazine; thanks a lot.

LUKE BONNSTETTER
Algona, IA

Luke, my first suggestion is that you get an instruction manual; if not from the guy who sold you the

truck, then from Associated. Rebuilding the shocks with the new seals should stop your leaking problem. A rear spoiler will add rear traction. An underwing? What's that? You don't need telescoping drive shafts, and you probably don't need the Hydra Drive unless you plan to race. As for good hop-ups, if you need new dogbones, check out MIP's CVDs: they're great! You should also consider a set of titanium turnbuckles, such as Lunsford Punishers—very beefy! After that, just get another battery pack, and go out there and have some fun.



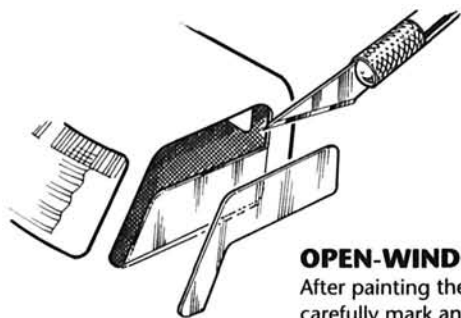
JIM NEWMAN

ILLUSTRATIONS BY JIM NEWMAN



PIT TIPS

by Jim Newman



OPEN-WINDOW POLICY

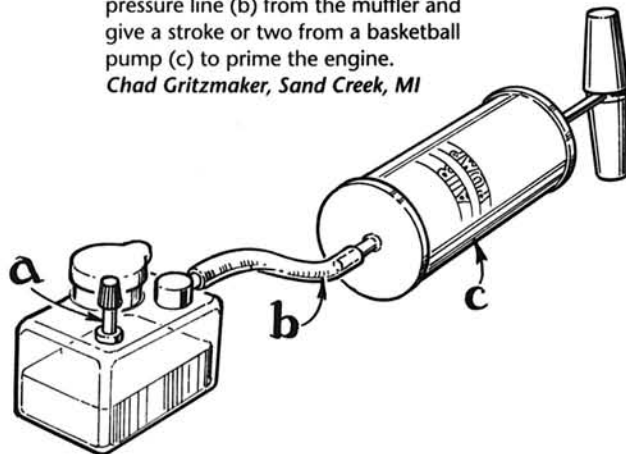
After painting the body's shell, carefully mark and cut out the window material as shown. Your windows will look as though they're partly rolled down.

J.R. Dennewill, Lakewood, CA

PUMP 'N' PRIME

If the primer pump (a) on your fuel tank stops working or if your tank doesn't have one, disconnect the pressure line (b) from the muffler and give a stroke or two from a basketball pump (c) to prime the engine.

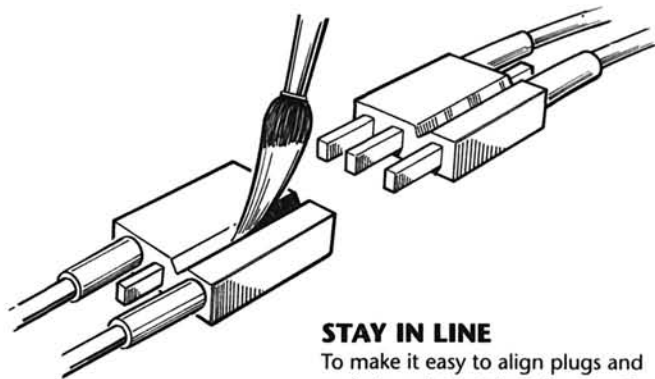
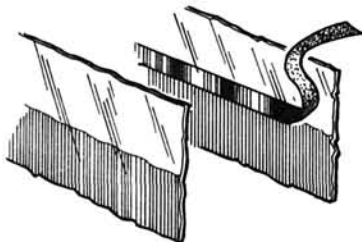
Chad Gritmaker, Sand Creek, MI



HIDE THE JAGGIES

To hide the jagged lines that result from masking and then painting on that second color, apply a contrasting striping tape to the outside of the body.

Marbenn Cayetano, Harker Heights, TX



STAY IN LINE

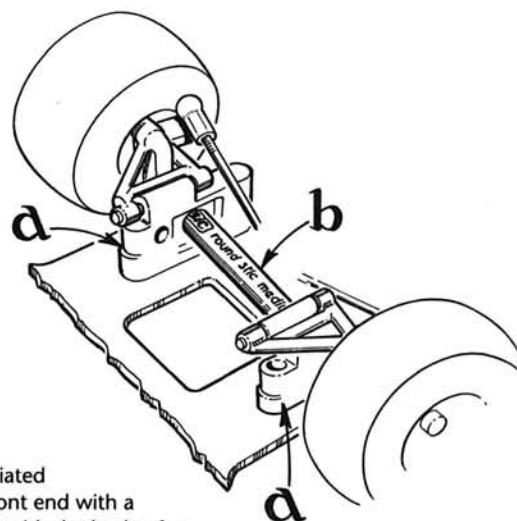
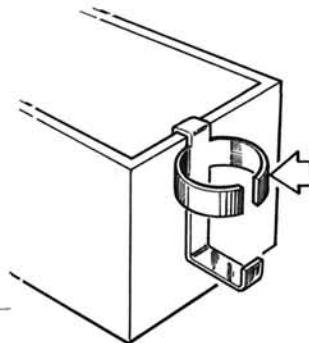
To make it easy to align plugs and sockets, paint a stripe of contrasting color in the alignment grooves on flat, Deans-style plugs and sockets.

Justin Richard, Salem, OR

MOTOR-SPRAY HOLDER

Hook an inexpensive drink holder over the end of your toolbox to hold your can of motor spray. Holders are readily available in any auto-parts department.

Mike Demchak, Browns Mills, NJ



FRONT-END BRACING

Brace your Associated reactive-caster front end with a tube that's made with the body of a Bic® pen. Loosen the screws under one of the blocks (a), insert the tube brace (b) into the larger indentation on the blocks and re-tighten the screws. Take care not to cant the blocks outward because this will alter the wheel camber. A broken graphite axle also works well.

Bruce Triplett, Martinez, GA

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



by Brian Leslie

All About Suspension



SUSPENSION SETUP AND TUNING are crucial aspects of R/C car maintenance. This month, I'll cover some basics that every R/C car driver should know.

Shock damping refers to the shock's ability to control the rate at which the suspension moves. Two types of shock oil help to control this damping action:

- Standard conventional oil.
- Silicone oil—the most popular type. It's used more frequently in racing because it retains its viscosity regardless of temperature. Shock oils are rated by weight—the higher the rating, the thicker (heav-

ier) the oil. The thicker the oil, the slower the shock's damping action. If your car seems to bounce excessively, the shock spring is overpowering the shock oil. A heavier shock oil will help to keep the wheels on the ground and give you more control. If the car seems sluggish and unresponsive over bumps and through turns, the shock oil is too heavy; try something a little lighter. Never use oils of different weights in the left and right shocks. You can, however, use different weights in the front and rear shocks.

Shock pistons also help to control damping, (don't confuse them with

the shock shafts). They are mounted on the shock shafts, and they move up and down with each stroke of the shock. In each shock piston, there are holes through which the shock oil flows when the shock is compressed. By changing the size of these holes, you can vary the speed at which the shock will be compressed and rebound. Most manufacturers of shocks sell a variety of shock pistons that are numbered according to the sizes of their holes.

Note the many shock-mounting holes in the shock towers and on the A-arms. By changing the shock's angle, you can make the suspension more or less sensitive. For softer suspension, mount the shocks at a lower, more horizontal angle.

For firmer suspension, mount the shocks at a more vertical angle. I generally mount all my shocks in the center holes at first. Then I drive the car for a while and make adjustments according to its performance. Always make sure that both of the front shocks and the rear shocks are mounted in matching holes.

One of the most common mistakes made by a beginner is thinking that, by lowering the shock collars, they'll change spring ratings and thereby stiffen the suspension. Not true. Lowering the shock collars only raises the ride height of the chassis and increases ground clearance. To stiffen or soften suspension, you must change to a stiffer or softer shock spring.

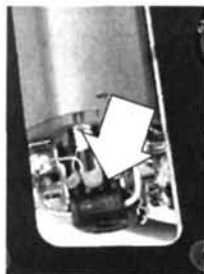
I want to buy an on-road gas car and would like to know whether I will need an ESC. Also, what are ball bearings?

First, you do not need an ESC for gas cars or trucks of any type. An ESC is only for controlling the battery power going to the motor of an electric R/C car. If this is your first R/C car, start with an electric one. After you have run an electric vehicle for a year or two, look into going gas. Second, ball bearings are devices used to support the wheels and transmission gears. Each bearing has numerous balls inside its casing. They allow a supported mechanism to spin freely.



What is a Schottky diode?

A Schottky diode is an electronic device used to stop excessive heat build-up in the braking FETs. The cooler the FETs, the more brakes you will



have. These diodes only allow current to flow one way, so pay attention when you install them on the motor terminals. Never install a Schottky diode when using a reversing ESC!

At my local track last week, one of the racer's transponders stopped working. What is a transponder?

A transponder is a device that outputs a signal, which is picked up by a lap-counting device every time the car goes over or under the counter. Each transponder has its own signal. These devices eliminate the need for someone to sit on the sidelines and record each car as it crosses the start/finish line.

What are tabletop jumps and whoop-de-dooos?

Tabletop jumps resemble a tabletop. Usually, there is a sharp upward slope at the beginning of the jump, then it levels off for about 5 feet or so and then has a gradual slope off the back side for smooth landing. The idea is to clear the tabletop and land on the downward slope on the back side of the jump. Whoop-de-dooos are small jumps grouped in intervals throughout the track. There are usually too many to take all at



once, so the idea is to time the jumps so you clear two or more at a time!

I was told that fluorescent paint chips more easily than regular-type colors. Is this true?

I, too, have heard this so I gave Pactra* a call to see whether they could shed some light on the subject. They said they haven't had any problems with any of their fluorescent paints chipping under test conditions in the lab, and they have received no complaints from customers. They also said that

Dictionary

Ride height is an important component of off-road performance. To set ride height in an off-road car, first make sure that all the components have been installed (battery pack, speed control, etc.) and that the lower A-arms (front and rear) are parallel to the ground. Then run off a few battery packs to get a feel for the car's handling. If the car seems really loose, i.e., the back end slides during acceleration, raise the rear shock collars to lower the rear ride height. This will help the rear tires to get more traction. If the front end pushes or doesn't want to turn, raise the front shock collars to lower the front ride height. This will help the front tires to bite into the corner a little better.

E-clip

a small clip (in the shape of the letter E) that's used to hold hinge pins in place.

ESC

electronic speed control. This electronic switching device channels the power from the battery pack to the motor. It often replaces a mechanical speed control.

Endbell

used to support one end of the armature in a motor and houses the motor brushes and springs.

Exhaust header

the portion of the exhaust system that connects the muffler to a nitro-powered engine.

Some final notes:

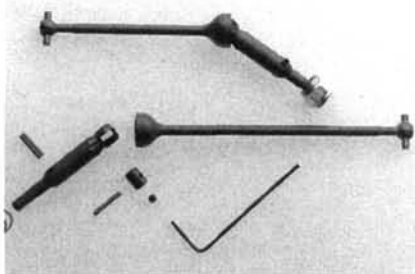
- Each pair of shocks (front and rear) must be as close to equal as possible, as far as spring rate, oil weight, shock piston number and mounting location are concerned.
- Never try to mix stan-

dard shock oil with silicone oil; the two don't mix! If you now use standard oil and want to switch to silicone oil, thoroughly flush out the shock with motor spray before you pour in the silicone oil.

proper surface preparation is vital and that most chipping is the result of poor preparation. I couldn't agree more. Make sure you wash the body in warm soapy water and rinse it thoroughly. While drying the body, try not to touch any of the surfaces you plan to paint (finger oils are bad news). Try to paint when the air temperature is above 70 degrees and there's low humidity (less than 30 percent). Allow ample drying time between coats, and shake the spray can vigorously as often as possible. You should always back up fluorescent colors with white paint (I recommend Pactra RC251), instead of fluorescent white (Pactra RC290). This will help prevent the paint from chipping and will also enhance its fluorescence.

What are CVDs? How are they different from my universal swing shafts on my RC10?

"CVD" stands for constant-velocity drive. This is a type of joint that allows constant rotation of the drive shaft at extreme angles. The CVD also has zero backlash, which is a credit to its design and precise fit. The universal swing shafts utilize two U-shaped joints that are joined by two pins. These units work well but, it's possible



to angle them to a point where they will bind, hindering the suspension performance and rotation of the drive shaft.

How long until I'm not a beginner anymore?

This all depends on you. If you drive your car or truck a lot and can control it as long as the battery pack lasts, you are well on your way to getting out of the beginner category. This hobby is growing so quickly, though, that I always feel like a beginner.

* Addresses are listed alphabetically in the Index of Manufacturers on page 166.



Modifieds

Race Prep has been building Modified Racing Motors for 12 years and building a racing record with State and National Championships. The high quality of our Stock Motors was generated directly from our Modified Motor expertise. If you've seen how fast Powerzone Stock Motors are, just imagine!

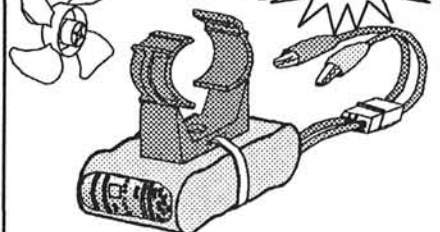
"E" Mod Motors

Built from State of the Art components, Handwound, Epoxied, Welded, Balanced, Diamond Trued, Precision Shimmed, & Dyno Tuned. Custom winds available.

#RP-905-102	Ten turn big wire double.	\$85.00
#RP-905-122	Twelve turn big wire double.	\$85.00
#RP-905-143	Fourteen turn triple.	\$85.00
#RP-905-163	Sixteen turn triple.	\$85.00

All motors include the Dyno sheet and a FREE Motor Tube.

Power Break-in Kit



Complete kit for breaking-in a motor. The battery pack powers the motor at low voltage while the fan cools the motor and also adds a load to the motor for more efficient break-in periods. Makes a great work station for soldering brushes. Do you have four extra cells? Get the Power Break-in Kit without batteries.

#RP-54	Power Break-in Kit	\$32.95
#RP-55	Power Break-in Kit without Battery	\$15.95
#RP-56	Motor Break-in Fan	\$3.95

Race Prep Racing Motors
P.O. Box 494, Paulden, AZ. 86334
(520) 636-1955
Send \$2.00 for catalog



What's New in Nitro?

So, what's new in the nitro world? Where should I start? Well, MIP* has updated its on-board temp gauge to withstand the abuse all of you are inflicting on this delicate electronic item. Some people have crushed the tiny thermistor that's on the end of the probe wire, rendering

the gauge useless.

To solve the problem, MIP has redesigned the gauge; the thermistor is now encapsulated, so it's better protected. MIP is also making the probe wire removable so that the unit can be used in many vehicles. (A plug-in connector will be used.) The probe wires will be

available separately, and they'll be longer, so you'll be able to cut them to the length you need. A 30-inch probe will also be available for situations that require it, such as for use in an R/C airplane.

With engines such as the REX, TOP and NovaRossi, the head bolts fit into countersunk holes on the head's bottom fin. With this type of engine, you can't bolt the probe into place. Instead, you

should cover the probe lug with silicone and slide it in between the bottom fins. As long as you let the silicone dry for 24 hours, the probe will hold well. I suggest that you use a good-quality silicone, such as Permatex Ultra-Copper, that's designed for high heat and has good thermal conductivity.

New Cars

Mugen* has just released a new $1/10$ -scale on-road chassis that looks very cool and is sure to be a contender against Serpent, BMT and Picco cars. It has many of the features you'd expect in a

top performer, such as active caster, a 2-speed tranny and belt drive. We'll have more on this new car as soon as we get our grubby little fingers on one.

OFNA* also has a couple of new on-road gas cars. We showed you the $1/8$ -scale on-road Colt in "New for '95" (January 1995). Now OFNA has released a $1/10$ -scale version. Eighty percent

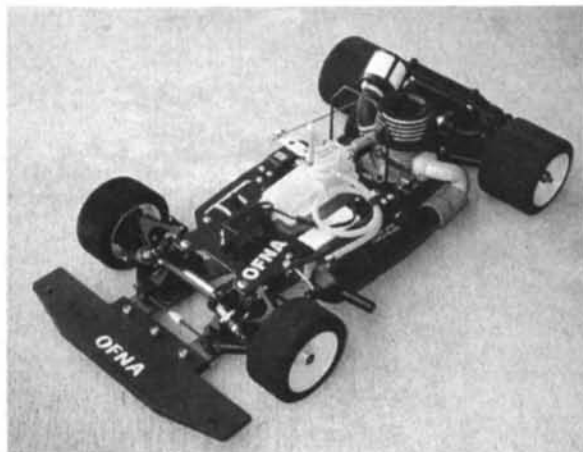
of the Colt 10's parts are the same as those in the $1/8$ -scale version, so you can easily swap parts between the two.

OFNA is also offering a new off-road buggy, the Ultra. The Ultra is a cousin of the HODR; it has the same drive-system components, but its chassis layout is like the Mugen Athlete's. Other features include a sealed radio compartment and sealed diffs.

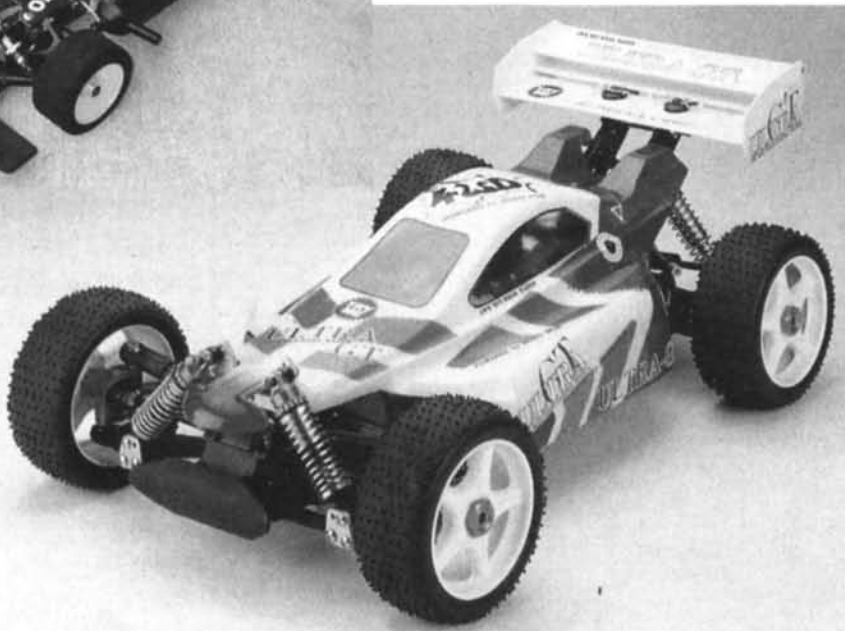
New Engines

A reader from The Netherlands wrote to tell me about a buggy engine being made by a company called De Ridder. The 3.5 engine is doing well over there and has some interesting features. First, the sleeve is ceramic or ceramically treated, so it's extremely durable. When you wear out the piston, you can send the engine back to the company for service. They'll ultrasonically clean the parts, check the crank and sleeve and replace the piston with a new one that fits perfectly. It's said to have other impressive features, but as of now, that's all I know. I don't have one right now, so I can't even show you a picture, but as soon as I get one, I will!

Traxxas* is now shipping new TRX-12 engines with its Nitro Hawks. The new engines are said to be much tougher and more powerful than the older Image ones. Traxxas has revamped the pull-starter, giving it a heavier cord and, for better fuel flow, the one-way bearing has been moved outside the engine. The engine comes with a top and bottom bushed conrod, and it also has slightly



Above: OFNA's $1/8$ -scale on-road Colt. Right: OFNA's new $1/8$ -scale buggy—the Ultra.



NITRO Q&A

I own a Kyosho Turbo Burns. It has full bearings, and it's powered by an O.S. Max .21 engine, controlled by a Magnum AM radio and fueled by 20-percent Blue Thunder. I love the way this vehicle handles, and its performance is number one, but I have a problem with the engine. It stalls when the fuel tank is half-empty. I can't get it re-started unless I refill the tank. I've checked all the fuel lines, and the tank holds pressure; what's the problem? I'm also thinking about a tuned pipe. How much power would I gain compared with using a muffler? Is it worth the money? I also want to purchase MIP's new onboard temp gauge. Is it worth it? If I buy one, what temp should my engine be? My local hobby shop says it's a waste of money because no one really knows what the temp of an engine should be. I'm very puzzled.

Greg Tinant
Ponteix, Sask., Canada

Greg, the engine-quitting problem you describe sounds as though it's caused by the fuel tank. On the Turbo Burns, the fuel

pick-up is a metal tube that sticks down into the tank and draws fuel from the bottom. Although it's unlikely, a small hole in this tube (inside the tank) will cause problems. When the fuel level falls below the hole, the hole will draw air, and this will cause the engine to run lean and quit. The easy fix is to replace the metal pick-up tube, or just replace the whole tank.

The tuned pipe will give you a slight improvement in power, but it might not be very noticeable. Unless your muffler is damaged or giving you problems, I'd keep it.

I do recommend the MIP temp gauge. Your friend at the hobby shop is partially right about there not being one perfect temperature, but you can find a suitable one. The best thing about knowing engine temperature is using it as a reference. If you know how to get your engine running well, knowing its temperature will give you something to aim for. MIP gives you a range of operating temperatures for .12, .15 and .21 engines, but your testing will determine what's best for your situation. When you know that your engine runs well at 240 degrees, you'll be able to prevent it from running any hotter.

Got a question about gas?

Send your letters to Nitro Q&A, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897.

different timing, so it's less "peaky" than the older Image engine. Also new is the carb, which features dual O-ring seals for more reliable operation. A new air filter is also coming soon. The engines will be sold with a cast head, and a machined version will be available as an option. The new engines should be in Hawks right now.

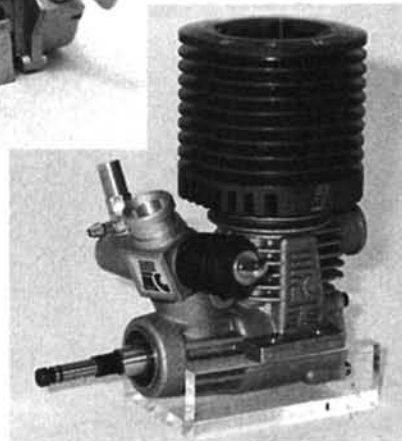
OFNA offers a new eight-port buggy engine with a 9mm carb—the Delta Force. It's said to be a great performer, and it will sell for less than two

bills. I'll give you more info as soon as I get it.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■



Left: Traxxas' new TRX-12.
Below: OFNA's Delta Force.



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Diff's and Dooleyboxes

EVERY ONCE in a while, someone comes up with a really great idea, and they don't even know it. That happened to a friend of mine last week, and I just had to share the results with you.

For years, I've been using a 4-cell battery pack to break in brushes on a new motor and to check a motor after cleaning it. The same old pack bounced around in my

toolbox for a long time, and I never really paid much attention to it. One night at the track, it turned out that my pack was fully discharged, and it wouldn't turn my motor over at all. I asked the guy pitting next to me, an R/C friend named Tim Dooley, if he had a 4-cell pack that he could lend me. He pulled out a small plastic box with a motor stand bolted to the top, a couple of power

leads with alligator clips poking out of one end and a switch attached to the other end. I asked Tim where he bought it, and he told me that he made it himself. It was the result of some late-night brainstorming and was made out of stuff that had just been lying around. It held his motor stand, motor fan and battery pack all in one place, and it prevented the batteries from shorting out

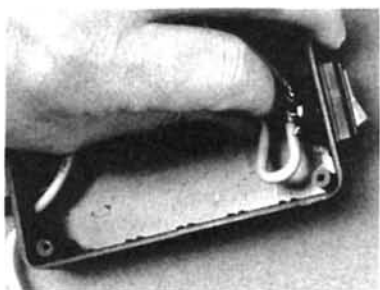
in his toolbox.

I went home and, as soon as I looked at my ratty old 4-cell pack, I knew I had to build a "Dooleybox" of my own. Radio Shack supplied the materials that I didn't have and, because I shopped for particular items to fit my specific project, I think I've managed to improve a little on Dooley's basic idea. Follow the pictures as I show you how to build your very own Dooleybox. And, Tim, thanks for the idea!



1 Start by assembling a 4-cell pack with old Ni-Cds that aren't good enough to race with anymore. I used red 1400 SCR cells here, but SCs or 1700 SCRCs will work just as well. Stay away from SCEs, because they can't take the constant charge/discharge cycles that you'll put these cells through.

2 Install a Radio Shack no. 275-691 heavy-duty rocker switch in the end plate of the no. 270-221 deluxe project case. The case is made out of plastic, so the cells won't short out. Because space is kind of tight here, drill the hole carefully. So that the top of the box will fit on, you'll have to shave off the top of the nut after it has been tightened (use a rotary grinder).



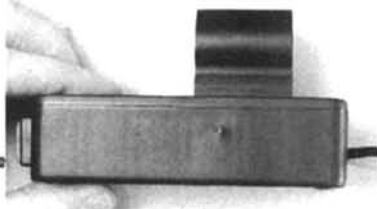
3 Wire the switch into the red (+) side of the circuit so that the circuit is open when the dot on the switch is facing upward. When the dot is facing downward, you'll get power. Solder the black lead wire directly to the negative side of the pack. Once again, space is tight, so plan your wiring carefully!



4 At the end opposite the switch, grind just a little of the interior screw posts away so that the pack will fit snugly into the box, and stuff a little foam rubber along the sides to prevent the cells from rattling around. I used old tire liners here, but you could

also glue the batteries in with RTV or Shoe-Goo. In the end opposite the switch, drill two holes for the power leads. Be sure to put the wires through the holes before you solder on the clips! Here, I used BRP* 14-gauge lead wire and a couple of old alligator clips that I already had. If you need some clips, Radio Shack sells them in several sizes.

5 I drilled two holes in the box's top and screwed on a motor clip from a BRP motor stand. If you prefer, you could also use one from Class*, Calandra Racing Concepts* (CRC), Robinson*, or S&K*. Put the clip toward one end of the box instead of in the middle.



6 With the clip toward one end of the box, the CRC motor fan is protected in the center of the box top when it's running (no more broken fans or snagged fingers!). To charge the pack inside, turn on the power switch (to complete the circuit) and hook the pack up to your charger. The box is also a convenient place to put decals from your favorite "sponsor."

DIFFERENTIAL UPDATE

Remember the "On-Road Diff Basics" article I wrote for the December 1994 issue of *Radio Control Car Action*? Since then, several manufacturers have come out with new and



Dave responded with a new, lighter version of his diff hub and a matching light-weight left-side hub. Together with his O-ring diff-ring-retention system, these axles and hubs are now among the lightest and smoothest available, and that would have put them right up there in the top group in my December column.

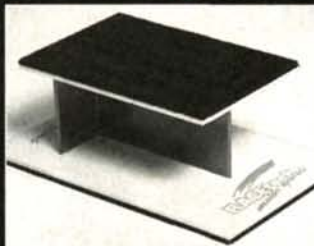


Associated* has designed a Stealth diff-ring setup for the 12LS, and this is the IRS version. It uses a short polyester axle, a light-weight diff hub, a beautifully machined bearing cone that doesn't use any Belleville spring washers and a matching left-side featherweight hub. The kit also comes with a pair of Associated's new rear rims that allow you to change a tire without changing the diff setting. The fact that all the bearings are now encased in machined aluminum instead of the plastic wheel rim means that the diff will be smoother longer!

improved versions of the products I showcased. One of them is Dave Irrgang at IRS Racing Services*. Back then, I thought that his axles and hubs were well-made and produced an incredibly smooth and long-lasting diff but also that they were kind of, well, porky.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■

RACETech motor sports



#9059 Tall Car Stand...
3" tall, perfect for off road car. Also Available in 1 5/8" tall version for 1/10 or 1/12 scale...
\$17.95



#9042 Motor Break-in Stand... Holds motor while breaking in brushes. Includes fan blade. Neon colors... \$8.95

#9063 EV10SS Battery Brace... Eliminates the need for taping or gluing the batteries together, fluorescent Pink or yellow... \$7.95
PN#9062 EV10 on road car... \$7.95



#9250 Associated Caster Kit... Adjust caster by simply turning a wrench. No more lost shims, and you set it exactly where you want. Kits available with graphite front braces...
#9250 Standard kit... \$8.95
#9252 12L w/Braces... \$15.95
#9254 10LSS w/Braces... \$15.95
#9256 10L w/Braces... \$15.95



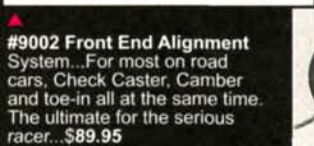
#9001 Caster/Camber Gauge... Made especially for the TRINITY EV10. Measurements are taken directly from the king pin. Models also available for Revolver 12 and Associated "STRUT" style front ends.
#9001 EV10 ... \$29.95
#9003 Associated . \$34.95
#9004 Revolver 12 \$29.95



#3030 Motor Case... Stores and organizes up to 12 motors in the motor tubes provided. Priced less than buying the 12 tubes separately... \$19.95



#6001 Brush Contouring Tool... Attaches to any stock motor to quickly pre-seat new brushes or to make "lay-down" type brushes. Includes .290" dia. cutting stone... \$24.95



#9002 Front End Alignment System... For most on road cars, Check Caster, Camber and toe-in all at the same time. The ultimate for the serious racer... \$89.95



motor not included

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PHOTOS BY STAN VAN DRUFF

by Stan Van Druff

KYOSHO **Pro-X**

Kyosho is renowned for their scale cars and trucks as well as their off-road gassers; now they're going after electric off-road-ers, in a big way too. Their latest—the Pro-X—is an inexpensive, but well-designed, 2WD electric buggy with almost everything a racer could want. When the Pro-X arrived unexpectedly at my door, I was elated to find a feature-rich kit that could be fine-tuned for any race track.

The Pro-X is available as a Sport version (reviewed here) and as a full-feature, race-ready Team model. The Sport version lacks the turnbuckles, ball bearings and aluminum shocks of the Team model, but it still has all the tuning capability that's needed to make it race worthy.



KYOSHO TURNS PRO

SPECIFICATIONS

Scale 1/16
List price \$169.99

DIMENSIONS

Overall length 15.2 in.
Wheelbase 10.7 in.
Front width 9.5 in.
Rear width 9.4 in.

WEIGHT (gross, ready to run) 3 lb., 8 oz.

CHASSIS

Type Molded two-piece
Material Keltron

It's loaded with features: rear toe-in and camber adjustments;
front toe-in; caster and camber
adjustments;
oil-filled, coil-over
shocks; and a lightweight
tranny with a

KIT FEATURES

The Pro-X is Kyosho's best high-performance electric buggy to date. It's loaded with features: rear toe-in and camber adjustments; front toe-in; caster and camber adjustments; oil-filled, coil-over shocks; and a lightweight tranny with a ball diff and slipper clutch. The compact Super Sprint Tranny is adapted from the Outlaw Rampage Pro nitro racing truck. It uses low-mass nylon gears, and the diff is mounted in the center of the tranny where it can easily be adjusted. The slipper clutch even lets you change spurs without disturbing the friction setting.

The two-tier Keltron chassis is incredibly stiff, and it's neatly laid out with a convenient ESC shelf built into the shock tower. It also has

DRIVE TRAIN

Type Sealed gear
Primary Pinion/spur
Transmission Gear
Rear differential Adjustable ball
Slipper clutch Friction slipper
Bearings/bushings Some bearings—mostly bushings

SUSPENSION (F/R)

Type Independent A-arm with upper link
Damping Oil-filled, coil-over, Keltron shocks

**ball diff and
slipper clutch.**

WHEELS

Type (F/R) One-piece with Lexan cover
Dimensions (DxW)
—front 2.2x0.575 in.
—rear 2.2x1.375 in.

TIRES

Front Ribbed
Rear H-pattern w/small spikes

THINGS YOU'LL NEED

- 2-channel radio system
- Steering servo
- ESC
- Motor
- Battery pack(s)
- Battery charger
- Lexan paint for the body

FACTORY OPTIONS

- Turnbuckles (get them!)
- Ultimate hard-anodized shocks—part nos. W5098 and W5099
- Full bearing kit
- 15-degree and 20-degree front hubs—XRW-01 and XRW-02

The bi-level chassis is really stiff! Molded-in webs also add to the stiffness, but they don't leave much room for the electronics.

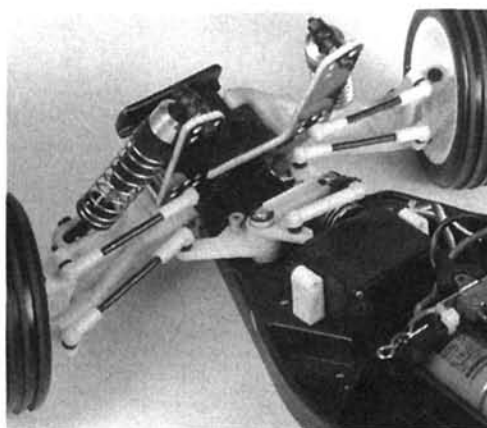
a foam-lined battery compartment that holds your battery firmly in place. Suspension arms are molded out of a durable, stiff, glass-reinforced composite.

The Sport version comes with cheap tie rods that have to be removed for adjustment. This is the one thing I think Kyosho should have done better. Any car that's designed for racers should have real turnbuckles. After you've yanked the ball ends off a dozen times to get your settings right, the tie rods are loose enough to pop off on their own. Do yourself a favor and get the accessory turnbuckles before you build the kit.

The Sport's shocks have Kelron bodies, which do a reasonably good job of damping the suspension. They work smoothly, but you can easily damage them during assembly. If you cross-thread the shock cap (as I almost did) you have to replace the body.

Other goodies include a bi-level plas-

tic wing that has a very solid, adjustable mount. Unlike cars with wire wing mounts, the Pro-X has a wing that's easily adjusted and stays put—even during numerous rolls. The front and rear wheels are one-piece units that are molded with the smooth side turned in. With the polycarbonate wheel



With the stiffener plate removed, the compact steering linkage is visible. You can also notice the lack of turnbuckles. I had to use that monster-size switch because I couldn't find a good place to mount the tiny switch that came with my ESC.

covers, this prevents dirt from accumulating in the wheels and slowing you down.

One of my favorite little features is the clear gear cover. It's made of tough, clear plastic that won't crack like thin polycarbonate covers do. You can easily tell which spur and

The Pro-X is not difficult to build, but you need patience. You'll also need to do some tweaking if you want it to perform at its best. I found some errors in the manual, and a few parts fit too tightly.

As usual, you start by building the shocks. Don't waste your time looking at the drawings shown with Step 1 because they're for the more complex Team shocks. Just follow the written directions.

The rear suspension arms didn't work smoothly. The 3mm-thick spacers between the arm and the hub carrier made the assembly bind, but it ran silky smooth after I had sanded 0.010 inch off each spacer. The upper hinge holes weren't perfectly aligned either, so I re-drilled the hole with a no. 31 drill bit (0.120 inch). The front suspension needed similar attention, but after a little work, all four corners performed flawlessly.

Before we get too far away from the rear suspension, here's the number-one tip for the rear end: put the hub-carrier pivot ball in the hole nearest to the center of the wheel, not in the upper hole, as shown in the drawings (I followed the directions and was sorry later!). I had to go back and redo some other pivot balls, too. Before you start, turn to Step 21 to see how to assemble them, and whenever the ball requires two nuts, be sure to use a thin one next to the ball.

LIKES

- High-quality construction.
- Full race adjustments.
- Stay-clean wheels.

DISLIKES

- Needs some tweaking.
- Assembly is a bit tricky.
- No turnbuckles.

PRO-X

pinion you're running, and you can even adjust the slipper through a hatch in the cover.

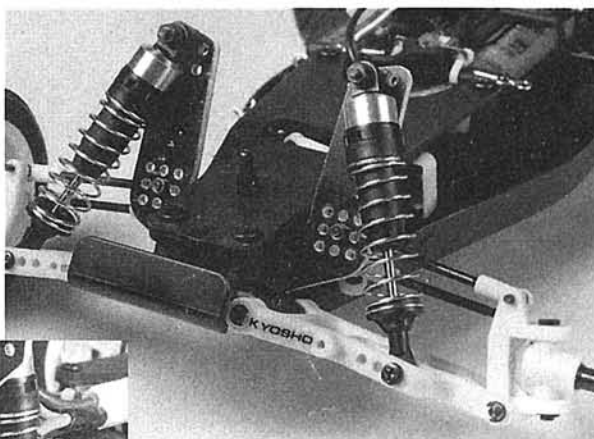
TEST GEAR

I really wanted to install a hot modified motor along with my new ultra-high-frequency M. Troniks* speed control. Then I realized that there wasn't room in the body for the slightly oversize controller. In fact, I was barely able to squeeze in my receiver. I ended up using my trusty Trinity* Slot Machine stock motor, Tekin* 411P ESC, Parma* 1400mAh matched cells and Sermos* Powerpole connectors. I chose a Futaba* Magnum AM radio and an inexpensive S148 steering servo (nothing exotic here, but this is a good example of what a novice racer might choose).

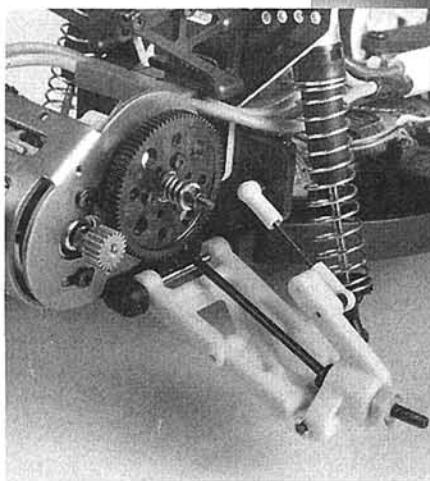
PERFORMANCE

The temperature outside hovered around freezing while I tested the Pro-X, so I filled the shocks with Associated* 30WT silicone shock oil. The shocks were sticky until they

some trouble with jumps because the buggy's center of gravity is a little aft of what I'm used to, but with a little practice, I was able to make the Pro-X jump as well as any other car I've driven.



Above: the front suspension has all the adjustments you need, although changing caster requires optional parts. The plastic shocks worked well but tended to stick after they had sat awhile. **Left:** the rear suspension offers plenty of adjustments, including toe-in options of 1.5, 3 and 5 degrees. If you build the kit, notice that the pivot ball uses the lower hole in the rear hub.

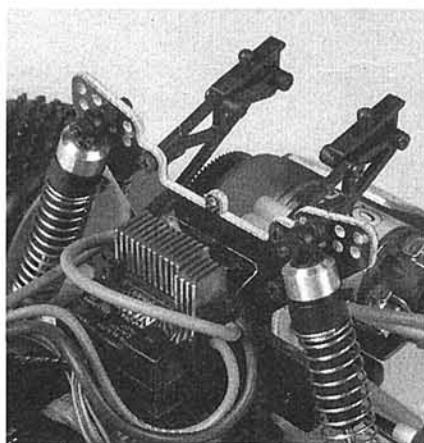


The Competition		Team Associated RC10CE	Kyosho Pro-X
	Wheelbase (in.)	10.25	10.50
	Width (in.)	9.625	9.30
	Weight	3 lb., 10 oz.	3 lb., 8.5 oz.
	Diff type	Adjustable ball	Adjustable ball
	Chassis	Aluminium	Kelron
	List price	\$230	\$169.99
	Available at*	\$115	\$109.99
	Issue reviewed	10/94	7/95
	*Prices vary with location.		

had warmed up. Initial setup took longer without the benefit of turnbuckles, but after I had the buggy dialed-in, it remained consistent. Overall, the car handled well.

I had a little trouble, though, with the transmission's slipping. I assumed it was a problem with the slipper clutch, so I kept tightening it. Eventually, the nut bottomed out, but the transmission still slipped; it had to be the diff. Fortunately, it was just a matter of removing a little red cap and snugging the diff with a hex wrench. When I reset everything, the tranny worked smoothly, and the slipper protected it from the jolt of landing off jumps at full throttle (my finger was frozen to the trigger!).

Steering was smooth and responsive, and there was very little tendency to push. The car easily outperformed the S148 servo I used. The buggy remained controllable on bumpy terrain, even in turns. At first, I had



The ESC (if it's not too big) mounts on a shelf above the battery. The adjustable wing mounts are sturdy and stay locked in position even after a crash.

FINAL THOUGHTS

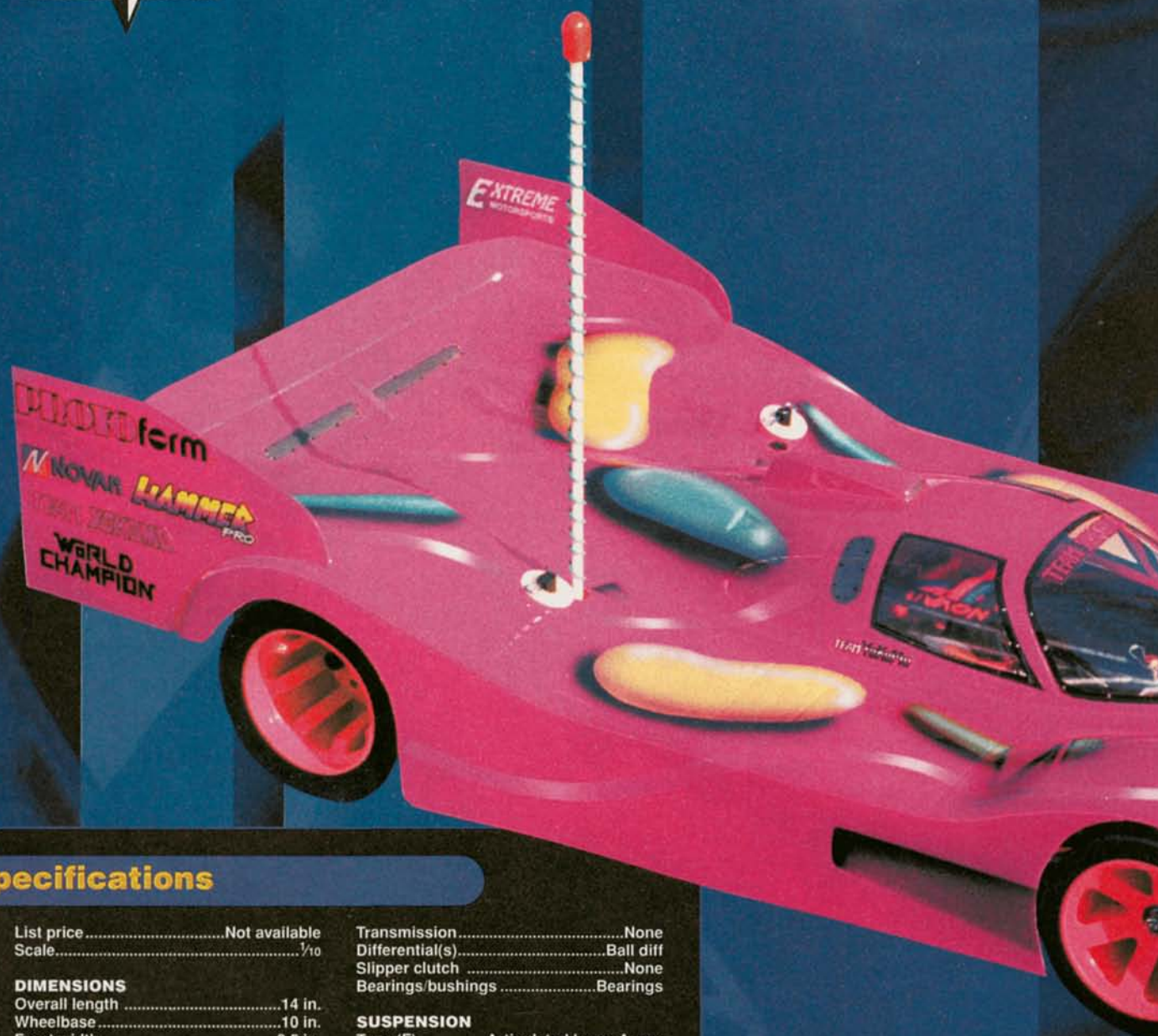
Kyosho has created a kit with many extras, but they've overlooked a few things, too. For instance, the chassis is cramped. I was barely able to squeeze in a standard receiver. I couldn't use the ESC I wanted, because molded-in bosses unnecessarily restrict the width of the space for the controller. Also, the motor needs a separate spacer, and that makes it difficult to re-install the motor after maintenance.

Overall, the Pro-X is an excellent kit that's filled with the details that any racer would appreciate. Some kit manufacturers have simplified their designs to make the leanest cars possible. Kyosho knows that many racers appreciate the little extras and have included them without adding weight. The kit materials and workmanship are superb and, with the exception of a few suspension parts that were too tight, everything fit perfectly. Kyosho also always throws in some spare fasteners in case you lose something during assembly.

The Pro-X Sport has so many adjustments and needs so much tweaking that I wouldn't recommend it as a first kit. For the same reasons, however, I strongly recommend it for someone who has built a kit or two and wants a challenging buggy—especially someone who wants to get into serious racing without breaking the bank.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

CAR ACTION
**THRASH
TEST**
1/10 SCALE ELECTRIC



Specifications

List priceNot available
Scale1/10

DIMENSIONS

Overall length14 in.
Wheelbase10 in.
Front width8.5 in.
Rear width9 in.

WEIGHT

Gross (RTR w/ 6-cell pack)42 oz.

CHASSIS

TypeDouble deck
MaterialFiber-reinforced
graphite and fiberglass

DRIVE TRAIN

TypeDirect drive
PrimaryPinion/spur

TransmissionNone
Differential(s)Ball diff
Slipper clutchNone
Bearings/bushingsBearings

SUSPENSION

Type (F)Articulated lower A-arm
with fixed upper plate
Damping (F)None
Type (R)U-shaped flex-plate
Damping (R)Friction shocks (2)

WHEELS (F/R)

TypeNylon
Diameter1 3/4 in.

TIRES

(F/R)Medium-compound foam

Will it make YOU a World Champion, too?

by Doug Mertes



Yokomo **YRX-10**

TEN CARS PREPARING to race the A-Main at the IFMAR $\frac{1}{10}$ -scale on-road Worlds sat on the grid in Sonneberg, Germany. They were piloted by the best on-road R/C racers in the world. Three Mains were run, and the results of the best two races were combined for a final score. Only one car and driver would be declared the winner and world champion.

One contender was a new, prototype, $\frac{1}{10}$ -scale Yokomo* chassis driven by former off-road and $\frac{1}{12}$ -scale world champion, Masami Hirosaka. This Yokomo chassis, like the Trinity* Evolution 10 chassis introduced at the first $\frac{1}{10}$ -scale on-road World Championship in 1992, took the top spot in qualifying and turned the racing world on its ear. Masami subsequently won two of the three final Mains, and was crowned the world champion.

The Yokomo YRX-10 you see here is the production version of Masami's world championship car. How well does it measure up to the competition in the hands of mere mortals like you and me? Will it impress amateur R/C racers as much as it has the pros? Read on to find out....

KIT FEATURES

The YRX-10 combines the best of today's technology. Both the front and rear suspension designs are new to the $\frac{1}{10}$ -scale class, and the components are well-finished and made of graphite, nylon, fiberglass and polished aluminum—fine quality that's typical of Yokomo.

Although the kit doesn't come with a body, the supplied body posts allow the builder enough flexibility to mount any current Lexan body (GTP, stock car, sedan, or sports car) that was designed for a wide chassis. Medium-compound tires and sturdy nylon wheels are included and should prove a good starting point for most new owners. Standard pan-car wheels and donuts will also fit, so you don't have to buy new ones if you have a favorite brand. I really like the Jaco* Pink-compound tires because they give me consistent traction on asphalt.

The main chassis plate is cut out of close-weave graphite that's very flex-resistant. Add the upper deck, which also acts as a battery-restraining device, and you have a solid, stable platform to work with. The chassis won't flex, so you can feel the results of your suspension tuning.

PHOTOS BY DOUG MERTES

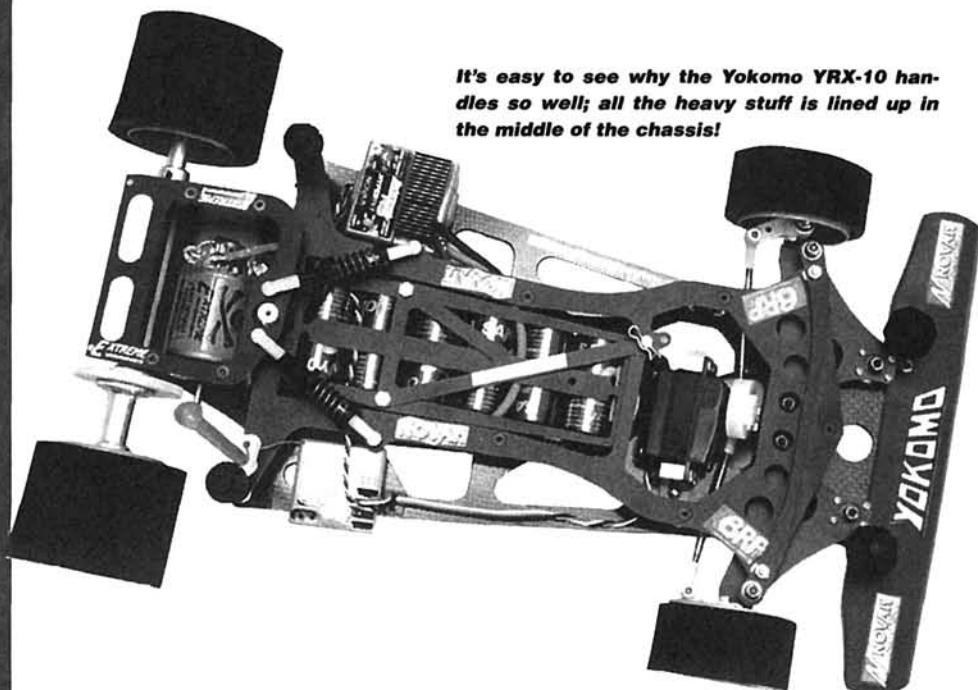
Building & Setup Tips

The rear pod is a typical, boxed unit, with twin aluminum side plates that won't flex under stress. I'd like to see rear-axle ride-height adjusters included with the kit (right now, you can only adjust ride height by using tires of a different size), and I've already talked to a machinist friend about milling reliefs for adding a set of spacers to the side plates. The kit's graphite rear-axle looks solid and well-made, and it produces a smooth differential using diff rings and balls (included). I substituted a Robinson* 116-tooth, 64-pitch, racing-machined, white thin silencer spur gear for the kit's 48-pitch spur, because it gave me greater gearing latitude (especially with the modified motor).

The rear flex-plate is different from any I've ever seen. Because the batteries are placed in the center of the chassis, there's no room for a traditional T-bar. Instead, the flex-plate is U-shaped and runs along each side of the battery pack. The rear pod is attached to the flex-plate with rocker balls and nylon ball keepers, and the whole arrangement creates a very smooth rear-pod action. This is damped by a pair of shock absorbers that provide adjustable resistance without using any shock fluid. Instead, a captured O-ring squeezes the shock shaft and produces friction to retard movement. The action is precisely adjusted by screwing the cap farther onto the finely threaded shock body.

The kit comes with only one set of front springs, but progressive front springs from BRP* are available in a full range of rates and will fit well. I used Lunsford Racing* titanium turnbuckles to complete the connection between the front spindles and the steering servo, because I wanted something beefier and easier to adjust than the kit's threaded rods. The chassis plate has been pre-drilled for a steering servo, but the holes were too wide for the Futaba S132H I had chosen. I ran a small G-10 fiberglass plate under the servo mounts and bolted it to the chassis through the provided holes—simple, and it works!

Overall, the car may be assembled easily. Including the time it took to file the battery slots so they wouldn't short out the Ni-Cds, total building time was less than 4 hours.



Factory Options

Graphite upper deck
part no. ZX-03G

Graphite lower brace
no. ZX-19G

Graphite upper brace
no. ZX-20G

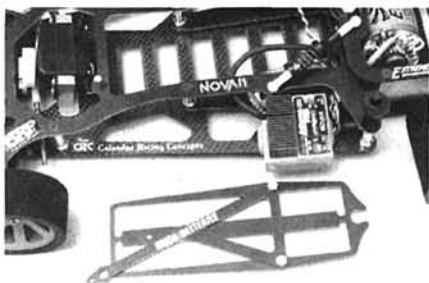
Front lower suspension arms
no. ZX-10G

Upper suspension arm
no. ZX-11

Magnesium hubs
no. ZX-24M (right side)
no. ZX-25M (left side)

Extra wheel sets

The front end is another example of Yokomo's innovative design. The lower arms are articulated fiberglass plates that are mounted on machined-aluminum stand-offs using a set of rocker balls and nylon keepers. Unlike traditional front-end designs that have a spring mounted on the front kingpin, the YRX-10 uses a second vertical pin that controls front ride height and spring tension and eliminates kingpin



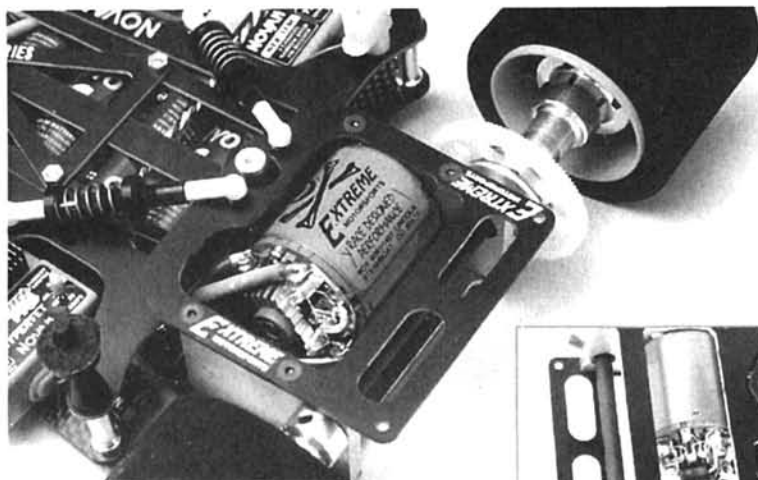
This neat battery-retention device eliminates the need for strapping tape.

likes

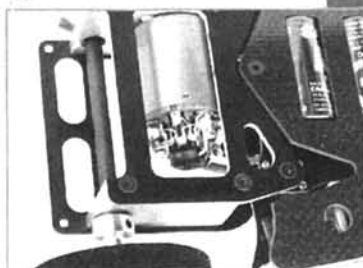
- Easy to assemble, this is a high-quality kit!
- Stable, forgiving handling.
- No need to take shock oil to the races.
- Stunning finished product.

dislikes

- Chassis should be just a touch wider where the ESC and receiver are mounted.
- Manual should have been translated more clearly.
- "Cheesy" steering linkage.



This innovative rear flex-plate design, coupled with neato-beano shock absorbers, provides smooth, well-controlled pod action.



Things You'll Need...

- Electronic speed control
- Transmitter and receiver
 - Steering servo
- 6-cell battery pack (stick packs fits too)
- Motor
- Battery charger
 - Clear Lexan body (Yokomo recommends the Protoform or Associated Nissan GTP bodies.)

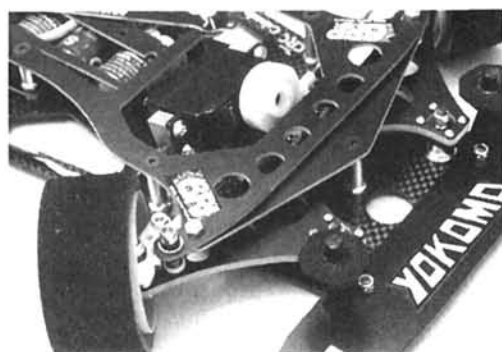
The Competition

	YOKOMO YRX-10	TEAM ASSOCIATED RC10LS	TRINITY EV10	CORALLY SP10V	HPI Roadstar	BOLINK XL Road Racer	PTI Hyperdrive
Wheelbase	10.0 in.	10.375 in.	10.25 in.	10.0 in.	10.3 in.	10.3 in.	11.5 in.
Front width	8.5 in.	8.250 in.	7.125 in.	8.4 in.	8.3 in.	8.2 in.	7.25 in.
Rear width	9.0 in.	9.125 in.	7.25 in.	8.4 in.	8.9 in.	8.85 in.	8.0 in.
Weight	2 lb., 10 oz.	2 lb., 6.16 oz.	2 lb., 8.34 oz.	2 lb., 10.4 oz.	n/a	2 lb., 9.5 oz.	2 lb. 8 oz.
Diff type	Ball	Ball	Ball	Ball	Ball	Ball	Ball
Chassis	Graphite/F.glass	Graphite	Graphite	Graphite	Graphite	Graphite	Graphite
List price	n/a	\$250	\$349.99	\$379.95	\$335	\$299.95	n/a
Available at*	n/a	\$123.99	\$184.99	n/a	n/a	n/a	\$129.99
Reviewed in	7/95	To come	4/93	To come	To come	To come	To come

*Prices vary with location.

stress. This front-end design also incorporates rising rate, or reactive caster, which reduces the front caster of the car as the arm is compressed. The rising rate is set by adding or removing shims and spacers under the front arm mounts.

I wanted a paint job worthy of the chassis underneath it, so I turned to the talented Tommy Hernandez of Hobby Hangar Speedway in Chantilly, VA. I designed and masked the body and mixed the custom colors, but it was Tommy's skill with the airbrush that put the paint on the Lexan.



A truly different, yet highly effective, front end; it's solid!

This is the kind of body that you don't want to put on the pavement, but I had no choice: it was time to find out what this baby was made of!

TEST GEAR

I used world-class electronics for this world champion car: a Novak* Hammer Pro ESC; a Futaba* S132H servo; a Novak NER-3FM receiver; a set of Orion matched Sanyo* SCRC 1700 mAh batteries, and an awesome Extreme Motorsports* 12-turn triple-wind motor. This is the kind of setup you'll find in an A-Main at the regional and national level; it tests the limits of the chassis' performance. I topped off the chassis with a Protoform* Nissan P-35 body.

PERFORMANCE

The weather in Virginia was pretty weird last winter—cold and windy one week, sunny and mild the next. I knew the pavement at my favorite test parking lot was clean thanks to recent rainfall, but the temperature worried me; cold weather and foam tires don't go well together! I really lucked out,

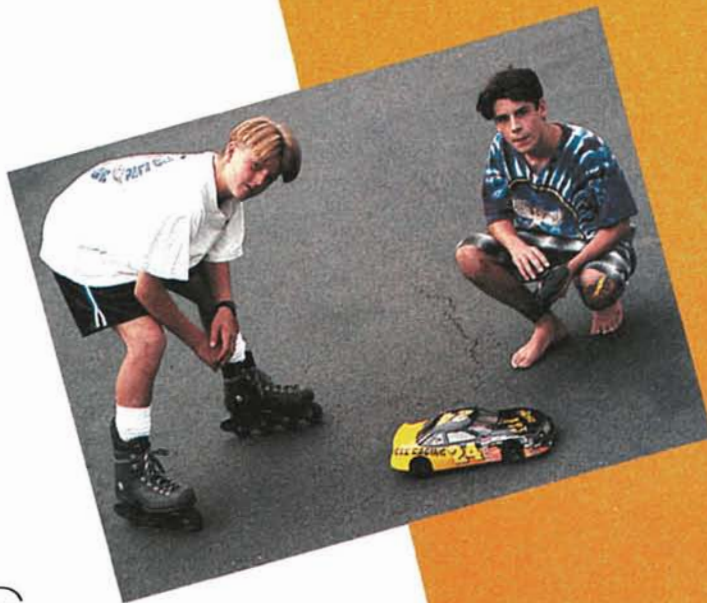
though, and got a fairly warm, sunny day to put the YRX-10 through its paces.

As soon as I put the hammer down, it was obvious that I had chosen a stable racing platform. The car stuck well on the straights, even with all that horsepower, and it drifted easily through the turns without spinning out. I played with the rear shock settings, but that was about it. Straight from the box, this car was hooked! Only the competition was missing. I'd have to wait for that.

FINAL THOUGHTS

The YRX-10 is the kind of car that leaves you with no excuses. It's well-designed, durable and capable of the highest level of performance. This car is almost as much fun to look at as it is to run on carpet or in the parking lot. No upgrades are required to be competitive. If you can't win races with this kind of equipment, you just need to practice harder!

* Addresses are listed alphabetically in the Index of Manufacturers on page 166.



S&K RACING ELC-2000

by Doug Mertes

I TALK TO a lot of newcomers in the R/C car hobby. They say that one of the most confusing aspects is the number of choices they have to make—equipment brands, types and models. Some of us have a lot of fun figuring out which tire and body will work with which chassis and which plug will fit which socket. To us, it's part of the lure of the hobby. Others, however, find the whole process so mind-boggling that they never get into R/C cars at all! Realizing this, Ken Dickerson of S&K Racing* decided to do something about it.

S&K already successfully manufactures and sells aftermarket products ranging from matched racing cells to motor brushes to a popular line of Lexan racing bodies for cars and trucks. Check the pits at any track in the country, and you're likely to find their Battery Claw, Motor Work Station and Pinion Pal being used by many of the racers. When Ken set out to produce S&K's very first car kit, he packaged it with almost everything required to operate the completed car—including a battery, charger, body, radio, speed con-

trol and motor! You just supply the paint, decals and AA batteries.

KIT FEATURES

The car is based on a 14-ply phenolic chassis—whew! Say that 10 times in a row really quickly. Actually, the chassis material is very similar to a G-10 fiber, but it's a little more flexible and absorbs shock slightly more effectively. Because the chassis doesn't have a rear suspension system, it has to absorb a lot of "road shock." Up front, you'll find a conventional kingpin/coil-spring suspension setup.

Ken was innovative enough to obtain radio gear (transmitter, receiver and servo) from Hitec/RCD, a 0-degree-timing closed-endbell motor from Mabuchi, a Model Troniks electronic speed control, a Globetek wall charger and a PowerSonic stick-type battery pack. Add a new, simple but rugged rolling chassis, wheels and tires from Jaco and an S&K Lexan polycarbonate body, and you have a pretty good entry-level package for those who are interested in trying on-road, parking-lot or oval racing on a budget.



PHOTOS BY DOUG MERTES

Value-Priced Velocity

SPECIFICATIONS

Scale.....1/16
Type.....2WD pan car
List price.....\$269

DIMENSIONS
Width.....8 in.
Wheelbase.....10 1/4 in.
Height.....5 in.
WEIGHT (gross w/battery).....47 oz.



DRIVE TRAIN
Primary.....Pinion/spur
Reduction.....None
Differential.....Ball type
Bearings/bushings.....Bushings

WHEELS (F/R).....One-piece-nylon
NASCAR type
Size (DxW).....1 1/2 x 1 1/2 inch wide fronts,
2 in. wide rear

TIRES (F/R).....Foam, medium compound

ELECTRICS
Hitec radio transmitter, receiver and servo,
Model Troniks electronic speed control,
closed-endbell Mabuchi motor and battery
pack and charger included.

BODY
Type.....Lumina stock car
Material.....Lexan

CHASSIS
Type.....Single-plane
Material.....Phenolic

SUSPENSION (front only) Spring/kingpin,
floating spindle

How small a budget? Believe it or not, the complete package is listed at only \$269, and many retailers knock off a few dollars to make it an even better deal. (You should find it in the \$229 to \$249 range.) I tested an early production kit, which came unassembled, but all the kits currently available come completely ready to run.

I've run many complex kits, so I didn't expect the ELC-2000 to pose any real problems for me. Entry-level drivers, however, might see such a car as more daunting. To find out how the car would be for a novice, I recruited three lots of testers. I had already painted the body, so the car was ready to go.

• **Group A**—two 14-year-olds who kind of hang around the track where I race. They don't own any cars, but they've seen folks work on them in the pits, and they have an idea of how things go together and function. They ran the car successfully in no time. I had to fight them to get it back again!

• **Group B**—two teens with average hobby skills and no exposure to the hobby whatsoever. Everything worked, but it took them a few minutes of tuning effort to make the car track straight and adjust the radio properly. They wanted to "borrow" the car for a few days, just to make sure they had "done everything properly." Yeah, right....

• **Tester C**—an adult with an interest in the hobby, but no real experience other than some modeling activity as a kid. After about 30 minutes or so of driving my car, he announced that he was going over to the hobby shop to buy his own to play with!

In other words, people of various skill levels can handle the car and make it work. They'll have fun without getting frustrated. Why should new drivers take a close look at this car? The thing is so darn simple, rugged and easy to use that new drivers are soon out on the street learning why this hobby is such fun instead of sweating it out at the workbench, wondering why they invested so much in something that they don't understand and can't get to operate.

The body is an excellent S&K narrow Lumina that's looks good when painted. Mike Leahy, of "...and Design"*, cut me some vinyl S&K racing graphics that look great against the black and fluorescent orange and yellow paint scheme that I created using Pactra* spray paint. Some Autographics* numbers and a NASCAR cluster make a realistic-looking ride.

TEST GEAR

I first ran the car with all the stock equipment. Then, curious about its performance potential, I mounted some racing electronics—a Novak* 410 HPC ESC and NER-3FM receiver, a Futaba* 132H steering servo and matched Sanyo* 1700 SCRC battery pack—and installed a series of increasingly powerful stock and modified motors.



The front end of the ELC-2000 is very simple but beefy. Caster can be adjusted by sliding the top front suspension plate fore and aft.

The Model Troniks ESC is a great performer. It has high-frequency operation and a torque limiter—features that are usually found only on more expensive units.

PERFORMANCE

I first ran the car in the street, because that's what it was designed for, and it's where most builders will run it. The high-torque Mabuchi motor and the chassis' forgiving handling made the car a lot of fun. Even without traction compound, the ELC-2000 had plenty of grip. Tight turns posed no problem, and I was pleasantly surprised at how well the car ran on the pavement.

Building & Setup Tips

- Paint for Lexan body

THINGS YOU'LL NEED

- Decals
- AA batteries

- Put an extra spacer on each front kingpin. I used an old 850-size Tamiya bushing, but a no. 8 washer or two from the hardware store would work as well. With only two spacers, there's too much slop in the front end.
- A little light oil helps the steering block to slide up and down on the kingpin.
- Use a servo-saver! The kit neither comes with one nor mentions it, but it's a good investment. I used an old Tamiya servo-saver, but Kimbrough* also makes an excellent piece for a couple of bucks. That's cheaper than finding a replacement servo! The spline pattern is the same as on a Futaba radio.
- Bevel the screw hole edges in the black Delrin pieces with a sharp hobby knife. The screws will go in much more easily, and the Delrin won't split.
- Cut the excess wire off the Z-bend steering linkage with a cutting wheel or a side cutter, or it will interfere with linkage movement. You need only about 3/4 inch of overlap.
- I mounted small nylon body savers (available in hobby shops and hardware stores) to the underside of the body with double-sided tape where the body posts pass through. This prevents the body pins that the body rests on from pulling through the Lexan when your car crashes.

LIKES

- Complete ready-to-run package in one box.
- Low price.

DISLIKES

- Doesn't include a fast charger; it should!

Team Losi TECH TALK

TAKE A NEW DIRECTION

Team Losi has recently developed a new front truck tire. This new "directional" front tire was first used by eight of the 10 drivers in the A-Main at the Winterchamps in Tampa, FL. This new tire features angled ribs on one side of the tire and smaller, straight ribs on the other side. The fact that the tire can be mounted in two different directions means that the tire is somewhat adjustable. For the most part, drivers are running the tire with the angled ribs to the outside. This new tire design is available in both Team Losi's exclusive "Gold" and "Silver" compounds. The part numbers are A-7505G (Gold) and A-7505S (Silver).

PREVENTATIVE MAINTENANCE

If you have ever broken a ball stud off the rear bulkhead of your car, you know what a pain in the neck it is to fix. The reason that these ball studs break is that the more stress and load that is put on the part, the harder the ball stud gets. This is called "work hardening," and it is inevitable with any metal part and some of today's plastic parts. A simple way to avoid "work hardening" and subsequent breakage is to replace the ball studs in the rear bulkhead after about every 1 to 1½ hours of run time. Sure, they will last much longer than this, but it is easier to replace a ball stud that is still in one piece than it is to replace a broken one. As for the other ball studs, even if they break, it's still easy to get them out. So unless you are going into an important race, leave them in place.

NEW LUBE

Team Losi has a new silicone differential lube. This new lube is engineered mainly for use with the hard carbide diff balls found in the Double-X and the Double-XT kits. This new diff lube results in an ultra-smooth diff and will now come standard in the Double-X and Double-XT kits. It will also be available separately—part no. A-3065. Although it can be used with the standard diff balls found in the Junior kits, it is not recommended because it is a smoother, thinner compound lube that, while working great with carbide balls, doesn't have the same protection for the standard diff balls as the standard diff lube does.

Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept. J, Chino, CA 91710.

ELC-2000

The M-Troniks* speed control S&K includes doesn't have reverse, so those who want to race in a parking-lot race won't have to buy another controller. (Most race organizers don't allow the use of ESCs that have reverse.) Without reverse, it's also hard to do spin-outs unless running on fine grit.

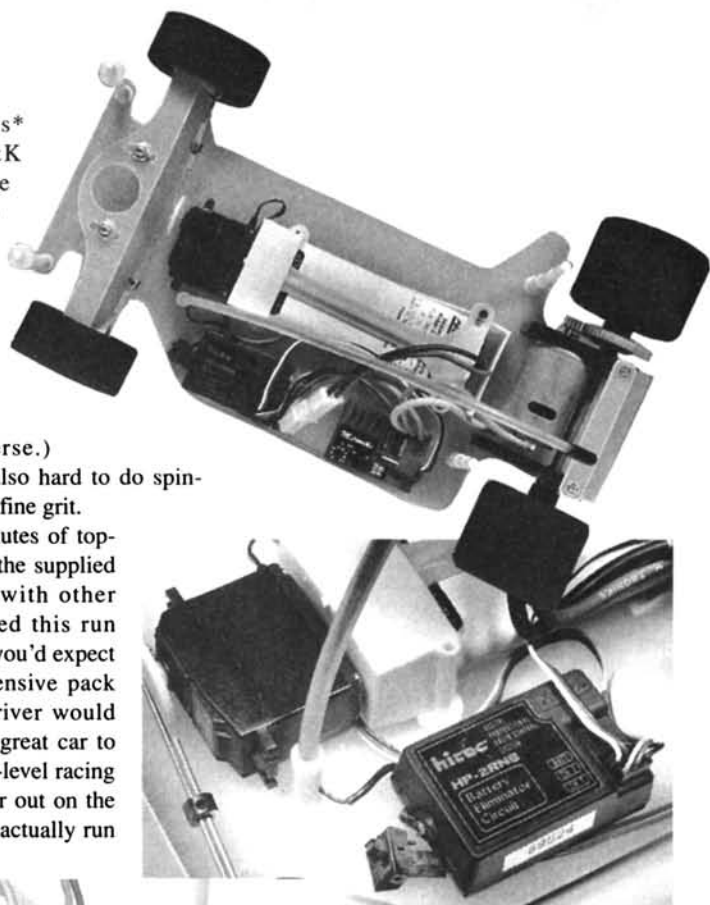
I got about 16 minutes of top-speed run time out of the supplied battery pack. Tests with other charged packs showed this run time to be about what you'd expect from a typical inexpensive pack that an entry-level driver would buy. This would be a great car to start a spec-class entry-level racing series with at school or out on the parking lot. You could actually run two heats and a Main without having to recharge your battery!

Next, I went to a carpeted banked oval track on a practice night. As I had expected, lap times were slow, but the car was easy to set up. Soon, I was running consistent lap times within 1/10 second of one another, lap after lap. This car would also be great for one of the run-for-fun classes that are now becoming popular. I ran several packs through the car, and it required no maintenance whatsoever. I just re-juiced the tires, recharged the battery and had more fun!

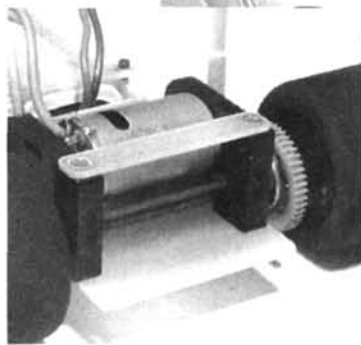
I ran another performance test with my hop-up electrics. Though I didn't set any track records, the car was remarkably well-behaved using hot stock motors and mild modifieds up to about a 17-turn single. When we got to the 14-turn double modified motor stage, the diff action became insufficient, and the absence of an adjustable rear pod made it impossible to set the car up for that kind of power. Still, it was a lot of fun, and no damage was done.

FINAL THOUGHTS

Entry-level drivers and newcomers should take a close look at this package! I gave it a pretty good beating, and it held up well.



Above: the included Hitec/RCD radio system performed well on the track. The small switch under the receiver turns the ESC on and off. Left: there's no rear suspension on the ELC-2000, but on smooth surfaces, that won't hurt performance. The included ball diff ensures that tight turns won't be a problem.



Nothing broke, fell off, burned up, or wore out. The teenagers who tried it were really enthusiastic about its performance, and the adults I talked to found it much less intimidating than a full race setup. Drivers of several age groups and skill levels found it relatively easy to tune and operate. Even more experienced racers agreed that it was a good, durable setup for the right customer.

There has been a lot of talk about encouraging new people to take part in this wonderful hobby. Tracks, hobby shops and race clubs have set up weekly race programs for those who enjoy close racing, but don't want to spend an arm and a leg to be competitive and are probably more interested in meeting new people than beating the person in the next pit. The attractively priced ELC-2000 is a complete package for new enthusiasts, and it offers an easy way to organize this type of class: racers just run their cars as is, out of the box!

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

EXTREME 10L

by DOUG MERTES

I'VE SEEN IT happening all across America. I've talked to street rats and parking-lot racers in hobby shops and had conversations through on-line services such as Prodigy. The same old questions continue to come up again and again:

Is my old, wide Associated 10L worth racing anymore?*

Should I buy a new 4WD sedan car to stay competitive on the parking lot?

Can I put any real horsepower into my pan car without doing donuts at the starting line?

Will I continue to wear out foam tires every week or two?

Can I get a sedan-type body that will fit my wide car?

If you've been pondering these questions, this Project car is for you. You see, I've been thinking about the same things. My wide Associated RC10L was

my very first pan car, and I've competed in a number of local, regional and national on-road and oval races with it. But even though I had carefully upgraded the car over time, it was still a handful on the parking lot, especially when outfitted with a modified motor. Against the current crop of sophisticated independent-suspension 4WD cars, I didn't stand a chance!

Then I heard about a new line of tires that Pro-Line* was introducing. Called Road Hawgs, they were supposed to be the hot ticket for unprepared (that means un-swept, grotty and dusty) asphalt and concrete surfaces. Available in Pro-Line's super-sticky world-championship-winning XTR compound, manufactured with a soft sidewall, and sold with foam inserts, they sounded like just the ticket to bring Mr. Wide Buddy back onto the parking-lot circuit.

I drove down to the hobby shop and picked up a set, as well as some of Pro-Line's cone dish wheels to mount them on. It only took a few minutes to turn the wheels bright yellow with Rit™-brand dye from the grocery store. Then I fitted the foam inserts, stretched the tires over the rims and glued them into place with a few dots of CA.

BODY BEAUTIFUL

Of course, with such neat new wheels and tires, I needed a new body to complete the look. That's when the trouble began. I must have fitted and measured two dozen bodies. Most were too narrow and would have let the tires poke out through the sides—not too cool for the lot! Some were wide enough, but they didn't have fenders or wheel-well

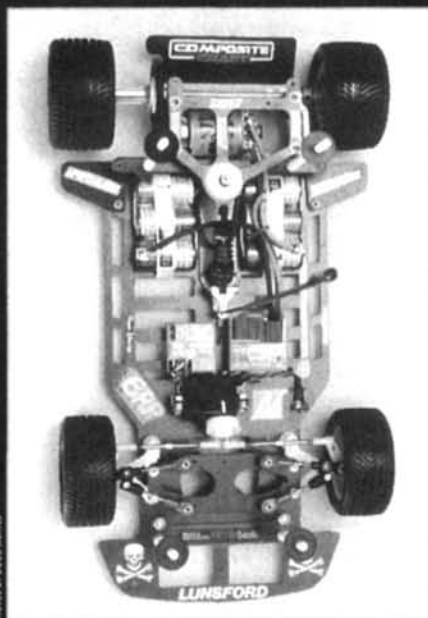
cutouts large enough to accommodate the largish (75x35mm) front tires through the entire steering arc. Other bodies had a hard time allowing the wide (76x44mm) rear tires to move with the rear pod.

After coming to the conclusion that no commercially available electric 1/10-scale body would fit, I called Ira Dahm at Dahm's Racing Bodies* to talk about 1/10-scale gas Lexan shells. I knew that gas cars had larger wheelbases and bigger tires than their electric counterparts, and I hoped that one of them would fit.

Dahm's had just released a new line of BMW M3 bodies. Called the "Extreme" series, it's sold in 4WD narrow sedan, 1/10-scale electric and 1/10-scale gas versions. By comparing chassis and body measurements over the phone, it sounded as though the gas body would fit as if it had been made to order! This body is more stylish than other sedan bodies, and it provides exceptional front and rear downforce, especially when it's equipped with the included rear spoiler. I think that the shape is really neat-looking, and it's easily recognizable as a BMW sedan. There's enough detail molded in to make a sharp finished product, especially when you use Parma's* Dekra car numbers and European sponsor logo decal sheets.

WEIGHT WATCHING

Once I had the wheels and tires on the stock chassis, I got to thinking about weight—especially the weight that was now hanging off the ends of all four axles. Although they stick really well, the Pro-Line pieces are pretty porky, even when compared with full-diameter



This Extreme can do everything from running on a roadcourse to an oval, to just slamming around on the street!

THE BATTLE



This new Bud's front end will let you adjust steering for every possible situation.

mounted foamies. If I was going to be competitive, I needed a way to control that weight and traction! So, my next step was to begin a comprehensive weight-reduction program on the rest of the car, while striving to increase strength, durability and precise tuning adjustment capability.

• **Chassis plate and rear pod.** I started with the foundation of the car: the chassis plate and rear pod. A stiff chassis plate allows the driver to adjust the suspension without the results being masked by chassis flexing. With a bunch of weight out at the farthest corners of the car, I needed the stiffest chassis I could find. Composite Craft by Advanced Design Concepts® (ADC) has been manufacturing graphite and fiberglass parts for the R/C and aviation industries for years, and I knew that I could count on them for sound advice.

It turned out that they had designed a new, wide, roadcourse chassis for the 10L made out of super-strong, 0.110-inch-thick graphite. Not only is this chassis much stiffer and more resistant to impact damage than its stock counterpart, but it's also 25 percent lighter!

Composite Craft also makes matching graphite upper and lower pod plates as well as the ultra-strong front bumper that's on the Project car. They were also able to supply me with a couple of T-bars in 0.063- and 0.074-inch thicknesses for tuning pur-

poses. The thin bar is for low-traction surfaces, while the thick bar works better on prepared asphalt surfaces with very high traction. I filed the battery slots to prevent the sharp edges from cutting the shrink-wrap on the batteries and causing a short circuit. Also, when I mounted the electronics, I gave myself enough room on the chassis to install the batteries either all the way

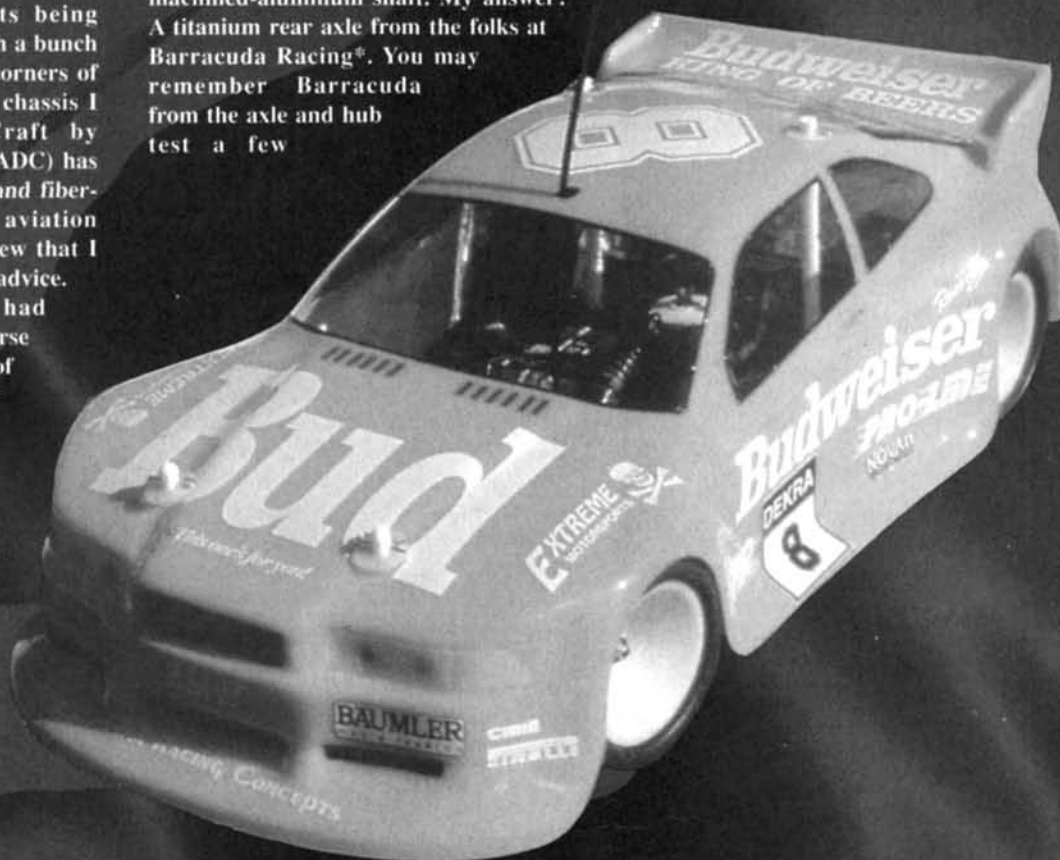
forward (if I wanted more steering and less rear traction). Sometimes, that's the hot test setup on a high-traction or carpeted surface.

• **Rear axle.** Although I was happy with the bottom pod plate and its spur protector, I was still concerned about the rear axle. I figured that one good hit (that means about 5 minutes of parking-lot practice time) would shear the stock-graphite axle off where it's mated to the machined-aluminum shaft. My answer? A titanium rear axle from the folks at Barracuda Racing®. You may remember Barracuda from the axle and hub test a few

months ago (*Radio Control Car Action*, December '94). Their Barracuda Lite Line parts were among the lightest of the components tested, but Barracuda also manufactures tough titanium axles for the "run 'n' bump" crowd. High-quality machine work means that the diff will be smooth, smooth, smooth.

• **Diff.** To ensure that the diff would stay smooth when exposed to parking-lot dust and grime, I used a set of BRP® ceramic diff rings and the special diff balls that come with them. I know folks who have used these rings for years without replacing them, and I figured it was time to give them a try. BRP also supplied the left-side magnesium wheel hub; it's much lighter than the stock part.

• **Bearings.** All the bearings on the car, including those used in the differential, are Boca Bearing® Ultra Seals. These are the best bearings you can buy for the parking lot or the street, because they require virtually no maintenance. You never have to clean or oil them; they're sealed for the life of the bearing. Just



TO THE DEATH

EXTREME 10L BODY PARTS LISTING



- Dahm's Extreme BMW M3 Lexan body shell—no. D021
- Extreme Motorsports 11-turn triple-wind modified motor
- World Class Batteries Sanyo 1700 SCRC cells
- BRP battery bars—6924
- Composite Craft front bumper—10087
- Composite Craft 3-inch body posts—19370
- Dahm's foam pads
- BRP Super Machine II front end (wide)—5526
- Pro-Line Road Hawk tires (front—1063; rear—1061)
- Pro-Line wheels (front—2557; rear—2567)
- Lunsford Racing Punisher titanium turnbuckles
- Robinson titanium ball links
- Kimbrough servo-saver
- Futaba S132H steering servo
- GPM slotted lightweight servo mounts—no. LS02
- Novak NER-3FM receiver
- Novak Hammer Pro ESC
- Composite Craft wide 10L road-race chassis—80012
- GPM antenna/shock mount—AL29
- Composite Craft 0.063-inch T-Bar—10122 (0.073-inch—10120)
- Associated 0.56-inch hard-anodized shock with black spring
- CRC Teflon damper disks—4010
- GPM titanium floating damper adjuster—LW04T
- Composite Craft 4-inch rear body posts—19380
- Composite Craft upper pod plate—10110; Teflon tape—12015
- Kimbrough 120-tooth spur gear
- BRP ceramic diff rings and balls—2115
- Boca Bearing ultra seal bearing set—05-15US
- CRC right-side diff hub—4005
- BRP magnesium left-side hub—6756
- GPM anodized aluminum motor plate—LS10
- Barracuda racing titanium axle—1000
- Composite Craft lower pod plate with spur protector—10128
- GPM anodized-aluminum left-side pod plate—LW11

blow or brush the dust and grit off from time to time, and they'll stay smooth and free-running.

• **Hubs.** The right-side hub is a neat piece from Calandra Racing Concepts* (CRC). Machined out of solid aluminum and slotted like crazy, it brings the right-side weight down. This hub uses a Corally-style ring-retention system that employs a rubber O-ring instead of a plastic pin to prevent the ring from turning on the hub under acceleration. Pressure between the hub (which captures the O-ring in a small machined groove) and the rough side of the diff ring, ensures that the ring stays put when you slam the throttle. A Kimbrough* 120-tooth 64-pitch spur gear and an 18-tooth Robinson* Stealth pinion gear gave me the right ratio for the large-diameter rear wheels and modified motor.

• **Rear pod.** The rear pod is also interesting in that it uses left- and right-side machined aluminum plates from GPM/Hobby Etc.* These are precisely milled and drilled to keep the axle bearings solidly locked in a vertical plane, even when the car is running through a series of sharp S-turns. The original nylon left-pod support isn't always up to the task because it can be bent and distorted. The motor plate has fins cut into the surface to increase the cooling area and heat dissipation. As a bonus, these plates are lighter than the stock ones, and they're available anodized in several colors!

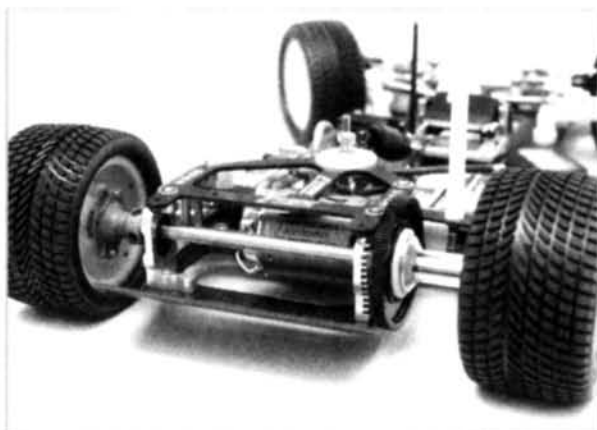
On the upper-pod plate, I used ADC's Teflon™ tape along with machined, solid Teflon™ damper disks from CRC. This combination ensures that the rear pod's action will be as smooth as possible and have no unwanted resistance.

Again, GPM's design team came up with a neat twist on the damper tension-spring setup. I've used their titanium "floating damper tube" on my oval car for almost two years, and it works well in this application, too. The knurled nut and fine threads allow the driver to make minor tension adjustments to the top and bottom springs at the same time. Neat idea!

I used GPM's matching Gold-anodized antenna/shock mount and their servo mounts. These are good-looking, functional parts that lock down their respective com-

ponents to the chassis plate and prevent them from shifting around under the rigors of battle or heavy-duty fun.

• **Front end.** For sheer eye-catching appeal, however, it would be hard to beat the BRP Super Machine II front end. This is a really interesting collection of machined-aluminum, titanium and graphite parts that, together, provide an almost limitless num-



The rear pod is tight and tunable—a perfect combination.

ber of front-end suspension adjustments. At the same time, the beefy nature of the parts assures me that this is one front end that should be able to survive the nasty R/C "death scenes" that are so often seen during a parking-lot race.

This innovative front end uses Associated lower front arms, a graphite upper plate, titanium turnbuckles and heavy-duty rod ends. Ride height, caster, camber and rising-rate (reactive caster) percentages are all adjustable, and the geometry is easy to understand and not intimidating.

Front-end travel looks as if it's about double what you get with a stock assembly, and that's critical on the parking lot. More travel lets the car react to bumps and surface irregularities without being thrown off course. You also get some tuning pieces such as progressive front springs and spacers. For positive, sure-footed steering control, a set of Lunsford* Punisher titanium turnbuckles and Robinson titanium balls and cups provide a solid connection between the front wheels and the Kimbrough servo-saver.

• **Electronics.** A rolling chassis like this really deserves first-class electronics, so I went all the way: Novak* Hammer Pro electronic speed control and NER-3FM receiver, a Futaba* S132H servo, an Extreme Motorsports* 11-turn triple-wind

modified motor and a set of World Class* matched Sanyo 1700 SCRC batteries assembled into a saddle pack using BRP battery bars. That's a lot of horsepower to pack into a street car, especially one without four-wheel independent suspension, but I was confident that the Hammer Pro's adjustable current limiter would let me back the power down on a slippery surface if it became necessary. At the same time, I knew that the super-low resistance of this setup would get every bit of power to the pavement when traction was available. This setup will work with any FM radio (or AM radio if you substitute Novak's cool new Polaris receiver), but I prefer to use my amazing JR*-756 transmitter. To ensure glitch-free running, be sure to use all three of the 0.01-microfarad capacitors and the Schottky diode that are included with the Novak speed control.

PROJECT PERFORMANCE

So, after having done all this research and having spent several months putting this Project car together, how did it turn out? Sometimes cars like this really don't have any advantage over ones that use only stock components. Occasionally, they're even less reliable. In this case, however, I have to say that the Extreme 10L was an unqualified success! There's *lots* of rear traction, even when I use the modified motor. The front end allows me to set up the steering for practically any situation or type of racing. People who race on parking lots know that if you can start with more traction than you need and tune it out a little at a time, it's a lot easier than working with too little traction.

You don't have to install all the mods at one time, either. Pick and choose those that make the most sense for your particular application, and buy the parts as your budget permits. This car can compete on a roadcourse, a flat oval and even a banked oval using the wide-to-narrow graphite conversion kit that's offered by Composite Craft. Even if you don't race in sanctioned competitions, this is a premium setup for running around with your buds in the school parking lot. You'll be rounding the final turn way out in front, while they're trying to figure out what you did to make your car so...extreme!

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.



#9503 INTRUDER for RC/10

BODIES for TRUCKS & BUGGIES

#9508 ROADKILL TWO NATIONAL TITLES



FOR OVAL AND ON-ROAD TRUCKS

HARD SHELL CASES for Transmitter - Dyno Batteries - Charges Motors - Comm Lathe Starting at \$47.95

#9500 Monster Truck	Universal fit	\$17.95
#9501 Slam it Lower	Universal fit	\$17.95
#9502 Intruder long nose	Universal fit	\$12.95
#9503 Intruder	RC/10	\$12.95
#9504 Blaze Runner	Lazer	\$12.95
#9506 Interceptor	Traxxas TRX-1	\$12.95
#9507 SE Concept	PRO SE	\$12.95
#9508 Roadkill	oval	\$17.95
#9509 Slam it Lower 2	RC/10 T	\$17.95
#9510 Concept 10	RC/10	\$12.95
#9511 Slam it LXT	Lazer	\$17.95
#9512 BTS Liberator	Losi LXT	\$17.95
#9514 Desert Runner	MRC World Scale & 1/8 Gas	\$25.95
#9515 XX-YZ	Losi XX car	\$12.95
#9516 BTS GT	RC/10 GT	\$17.95
#9517 Super BTS	XX-T	\$14.95

\$12.95

#9515 "XX-YZ" for XX



#9509 SLAM IT LOWER 2 for RC/10 T

\$14.95



#9517 XX-T SUPER "BTS"

Dealer and Dist.. enquires welcome - VISA & MASTER CARD accepted
A & L, P.O. Box 2115, Corona Ca. 91718 Catalog \$1.00 - (909) 735-5249

Factory WORKS Team Parts

Ball Bearing Steering Kits

For Associated kits

#1180	RC/10	\$29.95
#1185	RC/10T	\$29.95
#1186	RC/10 GT	\$29.95

For Team Losi Kits

#3180	JR 2, JR T, LXT	\$29.95
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For Traxxas Kits

#2185	TRX-1	\$29.95
#2186	Blue Eagle LS	\$29.95

For Tamiya Kits

#7180	Astute	\$29.95
#7183	King Cab & High Lux	\$29.95

For Yokomo Kits

#6185	YR 4 Sedan	\$29.95
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Give your OLD - OUT DATED

R/C car NEW LIFE

as a BACK YARD WARRIOR

with one of Factory Works

MONSTER TRUCK

CONVERSION KITS



5030 for RC/10 (shown)	\$52.95
5020 for Ultima	\$52.95
5025 for Lazer	\$49.95

Tires not included in kits

NEWS SCOOP

In search of speed secrets, 'cause winning is more FUN! by Daryl Lane

Factory Works battery hold downs for Associated RC/10's & RC/10T's, as well as for Team Losi's XX-Ts & XX cars are big hits with racers at all levels of competition.

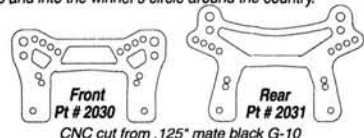
CNC cut from mate black 1/16th inch G-10 XX car shown Part #2206
RC/10 & RC/10T Pt #2205 (Assoc. one for 6 cells only)

These little beauties not only look great, but they work so well at holding in your packs, that one manufacturer has made their own line of hold downs. Factory Works hold downs are also battery safe and user friendly while the other ones can cause battery damage if not used correctly. This is because Factory Works hold downs are made of non conductive 1/16th" fiber glass, while the others our made of conductive graphite which could cause shorting.

For the Losi cars & trucks, battery changes become much easier than with the stock Velcro straps and each cell is covered, eliminating broken packs, during racing. Packs no longer can brake in two and - or fall out during the race.

All New for Parking Lot Racers

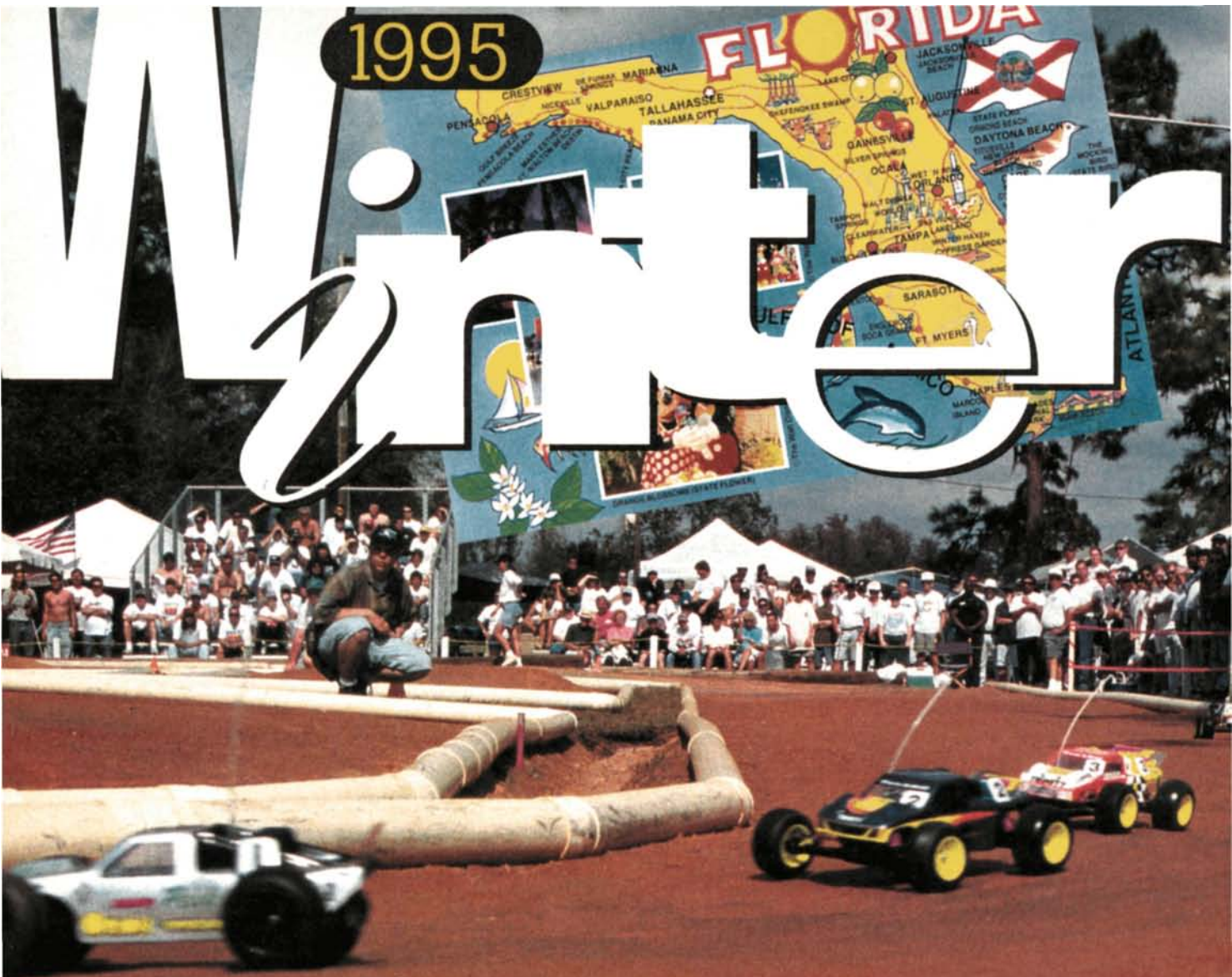
with Yokomo's YR-4s, are Factory Works FRONT & REAR SHOCK TOWERS, BALL BEARING STEERING KITS, WHEEL ADAPTERS FOR TAMIYA & HPI WHEELS, and a COMBINATION KIT that is a SPUR GEAR ADAPTER that ELIMINATES the ONEWAY and has a LIGHTENED SHAFT. Also in the works are some Factory Works TRUE SPIN WASHERS and SPACERS to help straighten and free up wheel spin. These parts are sure to find their way, onto the fastest cars and into the winner's circle around the country.



Steering kit with bearings	Part # 6185
Wheel Adapters for hex drive wheels	Part # 6190
Spur gear adapter and shaft	Part # 6195
True spin kit	Part # 9633

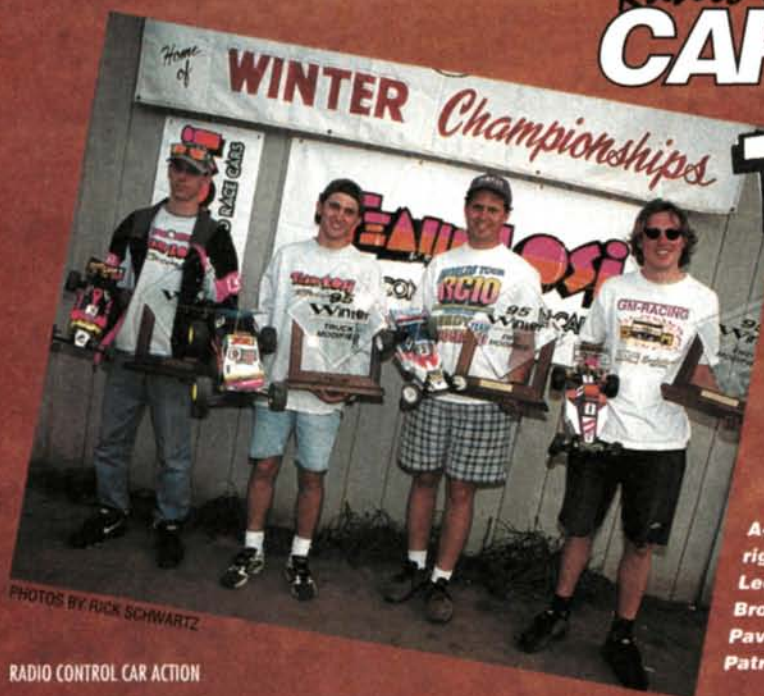
For more product info call Factory Works Tech Line at (909) 735-5516 between 3:30 & 5:00 PM. P.S. time

1995



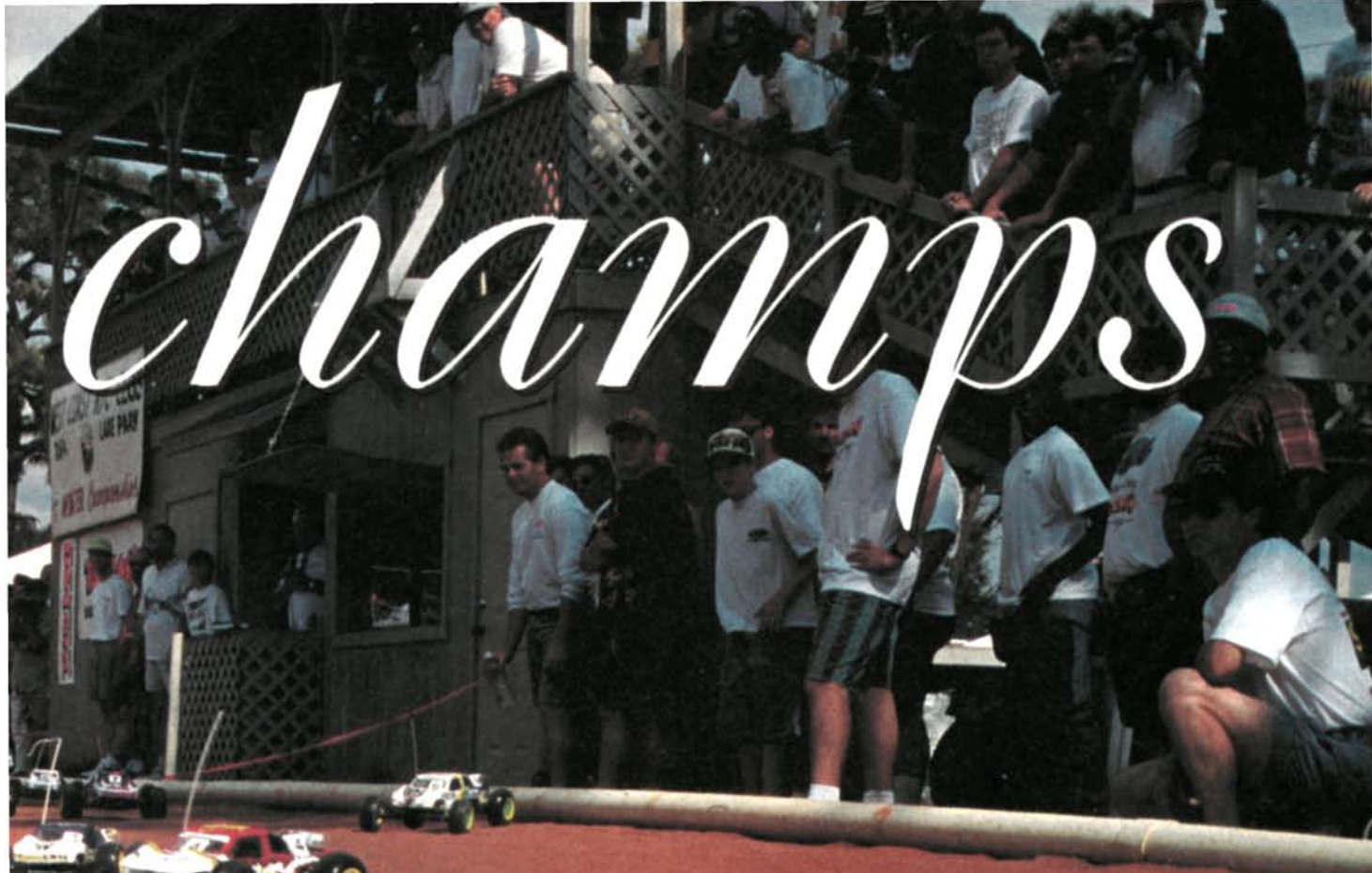
SPONSORED BY

Radio Control
CAR ACTION
TEAM LOSI



A-Main winners (left to right): Stock class—Matt Lee; Truck Mod—Scott Brown; 2WD Mod—Mark Pavidis; and 4WD Mod—Patrick Feschtschenko.

PHOTOS BY RICK SCHWARTZ



champs

BY RICK SCHWARTZ

LET ME TRY to put it into perspective. Horse racing has the Kentucky Derby; auto racing, the Indy 500; and football, the Super Bowl. For off-road R/C racers, it's the Team Losi and Car Action Florida Winterchamps. Why, you ask? Well, 400 drivers from more than 10 countries participate; all the major

no.

9 was mighty fine

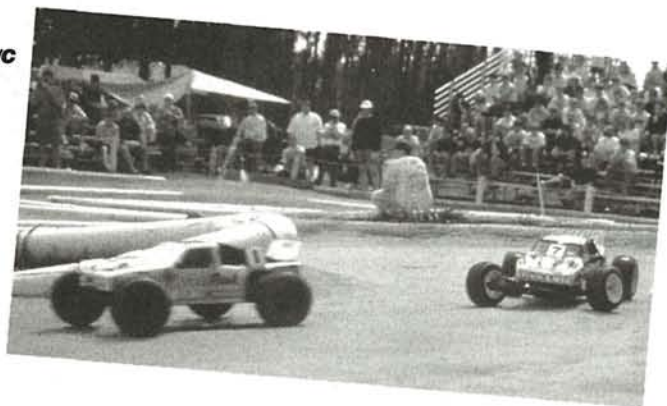
manufacturers attend; the facility and operation are world-class; and most important, it's held in Tampa, FL, where the weather is usually beautiful. This was the event's ninth year, and it lived up to its billing; it provided the racers and spectators with a week of competitive off-road action.



THE TRACK

The Tampa West Coast R/C Club again provided a newly designed layout that truly tested the driving and setup skills of even the most seasoned racers. Tire selection was the most important tuning decision that the racers made all week. If you picked the right tires, you stuck like glue; if you didn't, it was slip and slide all the way. By the end of qualifying, there was so much tire residue on the track that the racers could follow a certain line—the "blue groove"—and be assured of a little more traction. There was some controversy about whether those who qualified later in the day had an unfair advantage because the "groove" became more obvious and the track stickier.

Above: the West Coast R/C Club is one of the premier off-road tracks in the country. Right: the truck racing was fast and furious.



Comes in 10, 20, 30, 40 and First Run formulas.



THUNDER REIGNS



It's not too surprising that Blue Thunder is cleaning up at race tracks across the nation. After all, with one of the slickest oils known to man chemically bonding itself to the inside of your engine, you'd expect it to run faster, cooler and longer.

What is surprising is how easily your car cleans up after the race. Since Blue Thunder is such a clean burning, low residue fuel, you'll have less goop to mess with.

Check out this Dynamite fuel at your local track or hobby store today.



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New in the Pits

QUALIFYING

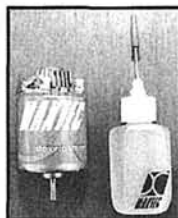
The Stock division, with almost 90 racers, was decided first. Jeffrey Kinoo, driving a Losi Double-X, turned eight laps in 4:06.55 in his first qualifier and held on to take the TQ. For everyone else, the third and final qualifier provided the magic; Michael Spehn moved from 12th to second with eight laps in 4:09.16. Matt Lee jumped from 11th to third with eight laps in 4:09.82.

The Truck qualifying session was similar to a game of king of the mountain. A racer was on top one minute and at the bottom the next. After the first round, Brian Kinwald was first with Mark Pavidis in second. The third round was a heart stopper. Kinwald slipped to 11th overall, and Pavidis slipped to 17th. Rick Hohwart piloted his new Associated RC10T2 to the TQ spot with nine laps in 4:20.56. Ellis Stafford was in second with nine laps in 4:20.580, and Brian Dunbar was third with nine laps in 4:21.560. Kinwald finished 11th and Pavidis was 17th.

Mod Car was almost like watching a rerun of the Truck qualifiers. After two rounds, no one had turned nine laps. The third round was blistering! Twenty seven racers saved their best for last—turning nine laps. Brian Kinwald, driving a Losi Double-X, was the TQ with nine laps in 4:17.960; Mark Pavidis was second and Ellis Stafford was third. Local racer J.R. Mitch moved from 27th to seventh, and Barry Baker jumped from the 29th position to the ninth. The 4WD qualifiers were faster because the finishing order didn't change as often. Patrick Feschtschenko, from Germany, drove his Yokomo YZ-10 to a TQ pace of nine laps in 4:12.070. Jurgen Lautenbach of LRP held down the second position with 9 laps in 4:16.150, and Jukka Steenari was third with 9 laps in 4:16.630.

Maxed out. A new player on the scene is Maxtec Development*. Racer and company rep Joseph Maloney introduced two of his company's new offerings. According to Joseph, Maxtec's new comm drops increase the life of the motor and improve performance. The drops decrease wear and keep the motor cooler; one drop is enough to last all day.

The company's new motor—the Maxtec Team Edition modified—has won many drivers over. In less than a year, Maxtec motors have won three national championships. Joseph told me that the secret is constant testing and upgrading.

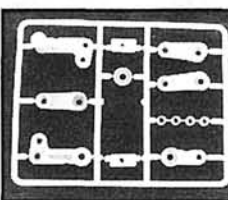


My main squeeze.

Associated Electrics* now packages three of its lubricating products in tubes. Stealth Diff Lube, Silicone Grease and Black Grease are all available in this convenient new dispenser.

Steer me in the right direction.

Team Losi* brought out some new parts for the big race. Their new "directional" truck front tires



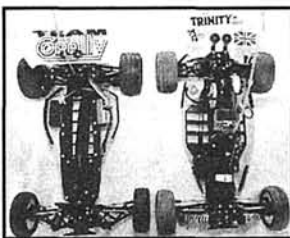
provided more steering and a smoother feel on the track. These "grippers," along with most of the other Losi tires, are available in the really hot Silver compound. According to Jack Johnson, they're softer than the Gold dots, they provide more traction, and they last longer.

Losi also introduced stronger white steering components that will minimize play in the steering.

Visco disco. Schumacher's* chief development engineer, Phil Booth, sat me down and described several new products, including the new Visco Drive. It's a fluid coupling that's attached to the tranny for better traction control. It has three flat disks and uses oil shear against flat plates with a slipper already built in. There's less chance of the slipper's coming loose using this system, and the unit can be filled with different grades of standard shock oil. It will soon be available for Schumacher, Team Losi and Associated off-road vehicles.

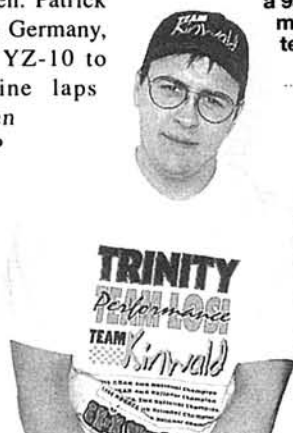
New names have been given and changes have been made to Schumacher's 4WD and 2WD buggies. The Cat 2000 95 EC (European champion) is the latest 4WD car. The changes to the Cat include an altered chassis (for better weight distribution), a new shock tower with laydown shocks, a lower CG (for better aerodynamics) and shortened rear wishbones (by 4mm) for more stability. The ever-present Cougar 2000 has

a 95 Team Car added to its name. The rear wishbone is mounted in a better place, and it has a three-position battery tray. Most important, it's a lot easier to work on.



Nice hat, Stan! Thanks, Ollie!

Trinity's* Todd Putnam and Brian Kinwald model the new Team Kinwald hats. The guys have not yet decided how to market this new headgear. Maybe using different models will help.



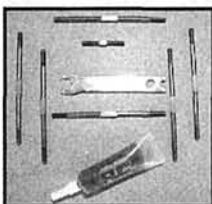
The finger saver.

You know how you rub your fingers raw putting ball cups on your tie rods? Well, Peak Performance* has come up with a wrench that will make this job fast, easy and painless. Made of aircraft-grade aluminum, this tool is a must for the serious racer who constantly makes suspension adjustments.



Slime me.

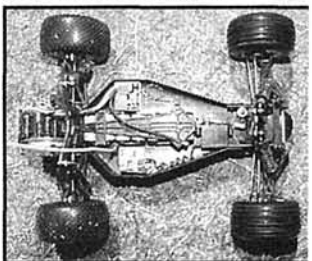
Cliff Lett of RCPS* showed me two hot products. His new turnbuckles are made of the strongest titanium available. They have 3mm



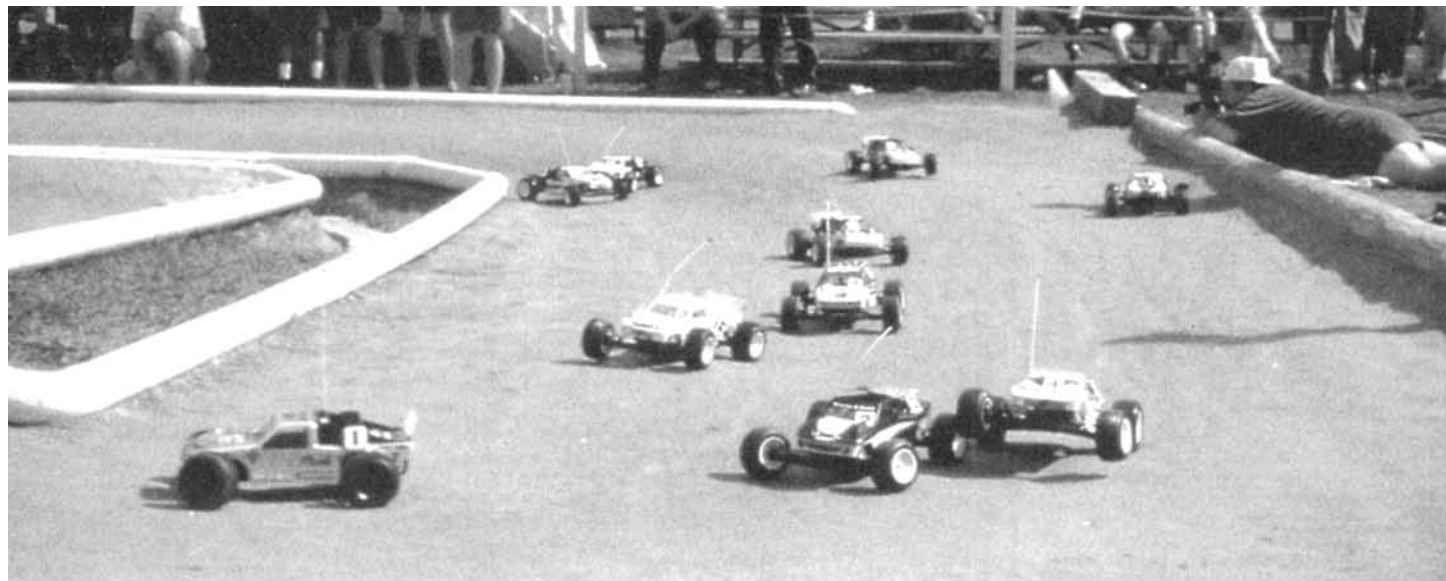
threads for greater strength and integrity and, because of the smaller thread pattern, you can make finer adjustments. Each set comes with its own wrench and is available for just about every car and truck on the market. The second item is tried-and-proven Green Slime—a must for shock rebuilds; it comes in a new squeezable tube—less mess on the workbench.

New and improved.

Making its debut at the Winterchamps was Associated's brand-new RC10T2. Almost everything on it has been redesigned to improve the already race-proven vehicle. Some of the numerous changes were made to the chassis, the



tranny, the suspension arms, the drive shafts and the battery holder. This list goes on and on. It's a winner in the Associated tradition; just ask Rick Hohwart, who was the TQ this year driving an RC10T2.



THE MAINS

This is what everyone was waiting for; who would take home the titles and the bragging rights for the year?

• **Stock.** The Stock class went off first; the one-A-Main format was used to decide the champion. TQ Jeffrey Kinoo led during most of the race, but he "wrecked" on the last lap and provided third-place qualifier Matt Lee with an opportunity to scoot through and win with eight laps in 4:12.60. Kinoo came back to take second with 8 laps in 4:12.340. Todd Lewis grabbed third.

The remaining A-Mains were decided using a three-race format. Every driver had three opportunities to show his stuff, and the two best finishes were used to determine the winners.

• **4WD.** The 4WD finals were really an international affair. Only one American, James Brown from California, made the A-Main. The rest of the drivers were from Germany, Finland and England.

TQ Patrick Feschtschenko drove to second-, third- and first-place finishes to take the overall title. Craig Drescher finished second with first-, fourth- and second-place finishes. Jukka Steenari took the third-place trophy home to Finland with third-, first- and fourth-place finishes.

• **Modified Truck.** The third title to go on the line was Mod Truck. Top qualifier Rick Hohwart stayed true to form by winning the first race. He didn't fare as well in the final two heats, and he finished fourth and ninth for an overall fourth-place finish. Scott Brown, driving a Losi Double-XT, didn't finish first in any of the three heats, but he used two seconds and a third to take the top spot. Jason Ruona finished second with second-, third- and fifth-place wins, and Barry Baker finished with a fourth, a seventh and a first to take the third spot.

1995 TEAM LOSI/ RADIO CONTROL CAR ACTION

2WD STOCK



Fin	Qual	Name	Chassis
1	3	Matt Lee	Losi
2	TQ	Jeffrey Kinoo	Losi
3	4	Todd Lewis	Losi
4	9	Jeff Masse	Losi
5	5	Larry Wilson Jr.	Losi
6	7	Boky Lee	Losi
7	10	Brian Bohlman	Associated
8	6	Rob Schaffer	Losi
9	2	Mike Spehn	Losi
10	8	Rob Michael	Losi

2WD MODIFIED CAR



Fin	Qual	Name	Chassis
1	2	Mark Pavidis	Associated
2	3	Ellis Stafford	Losi
3	TQ	Brian Kinwald	Losi
4	7	J.R. Mitch	Losi
5	4	Greg Hodapp	Losi
6	9	Barry Baker	Losi
7	5	Jeffrey Kinoo	Losi
8	6	Brian Dunbar	Losi
9	10	Cliff Lett	Associated
10	8	Scott Brown	Losi

4WD MODIFIED



Fin	Qual	Name	Chassis
1	TQ	Patrick Feschtschenko	Yokomo
2	5	Craig Drescher	Schumacher
3	3	Jukka Steenari	Schumacher
4	2	Jurgen Lautenbach	Yokomo
5	7	Werner Bergbauer	Yokomo
6	4	Thomas Jescsek	Yokomo
7	8	James Brown	Yokomo
8	6	Oliver Brandt	Lazer
9	9	Sonke Matz	Yokomo
10	10	Ben Sturnham	Schumacher

TRUCK MODIFIED



Fin	Qual	Name	Chassis
1	9	Scott Brown	Losi
2	10	Jason Ruona	Associated
3	7	Barry Baker	Losi
4	TQ	Rick Hohwart	Associated
5	2	Ellis Stafford	Losi
6	3	Brian Dunbar	Losi
7	5	Greg Hodapp	Losi
8	6	Jay Robinette	Losi
9	8	Jon Anderson	Losi
10	4	Kevin Moore	Losi

Last, but certainly not least, were the Modified finals. The best in the world were poised to go for the gold. Brian Kinwald—the race favorite—had his problems in the first two heats with two fourth-place finishes. The battle was between Associated's Mark Pavidis and Team Losi's Ellis Stafford. When the final race was over, Pavidis had a third, a first and a second. Stafford also had a first, a second and a third. The championship was given to Mark Pavidis, because he qualified second to Stafford's third. The difference in the original qualifying times was less than 1/2 second. That's as close as it gets. Brian Kinwald came back to his old form in the last heat to take first place, so he won third for the division.

On Our Own

You can go to a race un-sponsored and, with the proper preparation, run with the "big boys."



Left to right: Rob Michael, Boky Lee and Larry Wilson Jr.

WINTERCHAMPS WINNERS

Motor	Battery	ESC	Radio	Body	Tires
H.....	Badd Boyz.....	Tekin.....	Airtronics.....	Jammin.....	Losi
A.....	Powerline.....	Tekin.....	Airtronics.....	Jammin.....	Losi
N.....	Voodoo.....	Tekin.....	JR 756.....	Jammin.....	Losi
D.....	Badd Boyz.....	Tekin.....	Airtronics.....	Jammin.....	Losi
O.....	Gonzo.....	Novak.....	Futaba.....	Jammin.....	Losi
U.....	World Class.....	Novak.....	Airtronics.....	Jammin.....	Losi
T.....	World Class.....	Novak.....	JR 756.....	Jammin.....	Losi
	Perfect Match.....	Novak.....	Airtronics.....	Jammin.....	Losi
	World Class.....	Novak.....	Airtronics.....	Jammin.....	Losi

Motor	Battery	ESC	Radio	Body	Tires
Reedy.....	Reedy.....	Novak.....	Airtronics.....	RCPS.....	Pro-Line
Trinity.....	Trinity.....	Novak.....	KO Esprit II.....	Losi.....	Losi
Trinity.....	Trinity.....	Novak.....	Airtronics.....	Losi.....	Losi
Trinity.....	Trinity.....	Novak.....	Airtronics.....	Losi.....	Losi
Maxtec.....	Stealth.....	Tekin.....	Airtronics.....	Losi.....	Losi
Maxtec.....	Stealth.....	Novak.....	Airtronics.....	Losi.....	Losi
Trinity.....	Powerline.....	Tekin.....	Airtronics.....	Losi.....	Losi
Trinity.....	Trinity.....	Novak.....	KO Propo.....	Losi.....	Losi
Reedy.....	Reedy.....	Novak.....	Airtronics.....	RCPS.....	Pro-Line
Twister.....	Orion.....	Novak.....	JR 756.....	Losi.....	Losi

Motor	Battery	ESC	Radio	Body	Tires
Evolution.....	Mega.....	RH Digital.....	KO EX-1.....	Pro Tech.....	Losi
Reedy.....	Helbring.....	Novak.....	KO Esprit II.....	Stock.....	Pro-Line
Corally.....	Orion.....	M-Troniks.....	Sanwa.....	Stock.....	Losi
LRP.....	LRP.....	LRP.....	KO EX-1.....	Yokomo.....	Pro-Line
Evolution.....	Mega.....	RH Digital.....	KO Propo.....	Protech.....	Losi
LRP.....	LRP.....	LRP.....	KO EX-1.....	Stock.....	Pro-Line
Peak.....	Orion.....	Tekin.....	Airtronics.....	Yokomo.....	Losi
Evolution.....	RH.....	RH Digital.....	KO Propo.....	Lazer.....	Losi
Evolution.....	RH.....	RH Digital.....	KO Propo.....	Stock.....	Losi
Tanaplan.....	RH.....	LRP.....	JR.....	Schumacher.....	Losi

Motor	Battery	ESC	Radio	Body	Tires
Twister.....	Orion.....	Novak.....	JR 756.....	Losi.....	Losi
Reedy.....	Reedy.....	Novak.....	Airtronics.....	Associated.....	Pro-Line
Maxtec.....	Stealth.....	Novak.....	Airtronics.....	Losi.....	Losi
Peak.....	Orion.....	Novak.....	Futaba.....	Associated.....	Pro-Line
Trinity.....	Trinity.....	Novak.....	KO Esprit II.....	Losi.....	Losi
Trinity.....	Trinity.....	Novak.....	KO Propo.....	Losi.....	Losi
Maxtec.....	Stealth.....	Tekin.....	Airtronics.....	Losi.....	Losi
Extreme.....	World Class.....	Novak.....	Airtronics.....	Losi.....	Losi
Trinity.....	Trinity.....	Novak.....	Futaba.....	Losi.....	Losi
LRP.....	LRP.....	LRP.....	KO Esprit II.....	Losi.....	Losi

Many stock racers feel intimidated at races as large and prestigious as the Winterchamps. I'm sure a lot don't even apply because they think they can't compete with the sponsored drivers. This year's Stock A-Main proved that this isn't the case. Three drivers with minimal (if any) sponsorship finished in the top 10. Larry Wilson Jr. from Richmond, IN, qualified fifth and finished fifth. His only sponsors were his Dad, Wimpy motors and Gonzo Batteries. Boky Lee of Wintersprings, FL, qualified seventh and finished sixth. His sponsors at the start of the event were "me, myself and I." Finally, Rob Michael, who listed his sponsors as "Hobbytron and me," started in the eighth position and finished 10th. It just shows that you can go to a race un-sponsored and, with the proper preparation, run with the "big boys." These guys did pique the interest of some team directors, and when the flag went down for the Main, they may have had a little help. Just remember: they got to the A-Main without any!

OVER AND OUT

It was a long week, but well worth it for R/C race fans. The winners went home happy and the losers...well, wait till next year. Hats off to race director Bert Price, the West Coast R/C Club and the many sponsors who make this event possible. I enjoy going every year to see the new drivers and the latest innovations and to re-establish old friendships. You should put it on your schedule for next year.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

TRUCK of the YEAR

Radio Control Car Action



by George Gonzalez

ONCE AGAIN, election season was upon us. As usual, it was difficult to choose which truck would earn the honor of becoming *R/C Car Action* magazine's Truck of the Year. The sophistication that distinguishes most of today's pro-level racing trucks made choosing one over the others a real challenge.

But the folks at Team Losi* weren't surprised when they heard the news.... After all, the

Double-XT is the current ROAR and NORRCA National Championship-winning truck, and its design is based on that of the highly successful Double-X buggy. The Double-XT is the result of months of intense research and development by the Team Losi design staff and the factory racing team. It represents the cutting edge of 1/10-scale electric R/C racing technology, and we are pleased to name it our 1995 Truck of the Year.

THE ROAR
AND NORRCA
NATIONAL
CHAMPIONSHIP
WINNING TRUCK
IS HONORED

PHOTOS BY JOHN HOWELL

TEAM LOSI

Double-XT

TRUCK of the YEAR



THE KIT

By far the truck's most convenient feature is its modular design. As with the buggy, you can easily remove the tranny by removing four screws; remove two more screws and the entire rear end is in your hand. The truck's swing-away front end allows easy access to the steering servo and bellcrank assembly. The modular design really helps when maintenance time comes around, and cleanup has never been so simple and thorough.

Molded out of Losi's super-rigid Stiffezell material, the Double-XT's chassis is a longer version of the "Losi-G" (low center of gravity) chassis. It features the same 30-degree front kick-up angle and raised sides as the Double-X chassis. These raised sides give the truck approximately 1/2 inch of extra ground clearance on each side and that helps to prevent the chassis from dragging on the track during hard cornering, or when negotiating rough terrain.

The Double-XT's silky-smooth steering-bellcrank system features a built-in servo-saver and feels super-tight without a hint of slop—absolutely topnotch. The chassis also features an extra-long battery compartment that allows you to position the battery either forward for more steering, or toward the rear for more rear traction.

Super-long suspension arms, which are molded out of the same super-rigid material as the chassis, are on all four corners. The front arms are attached to the front bulkhead by means of hinge pins, and they're secured at the ends with a molded hinge-pin brace; the hinge-pin brace is attached with E-clips and keeps the front suspen-

sion tight. The outside camber-link can be mounted on the top, instead of on the side, of the new spindle-carriers. This makes front camber-link adjustment much more manageable. Losi's Hard Body hard-anodized aluminum shocks are included, as is a complete set of Losi Pink springs with a soft, 2.3 rating.

The rear pivot support is molded into the suspension arm mounts and gives the arms 4 degrees of anti-squat. The molded rear hub carriers provide 3.5 degrees of toe-in. Optional pivot supports and rear hub carriers

are available in various degrees of anti-squat and rear toe-in. The molded front and rear shock towers are extremely rigid and offer a multitude of camber-rod mounting holes for a virtually unlimited range of "adjustability."

The Double-XT's super-smooth tranny features a new laydown design with a slightly lower center of gravity than the previous retrofit gearboxes. A lower 2.61:1 final drive ratio is used on the truck (the buggy's final drive ratio is 2.19:1). The lower final gear ratio is better suited to the truck's taller tires.

Losi's patented Hydra Drive system is standard, as is an 88-tooth, 48-pitch spur gear. The truck also includes a set of universal dogbones that transfer the power to the ground smoothly and without binding.

Gold-compound step pins are included for the rear, and a set of HT-ribbed tires are included for the front. The same one-piece nylon rear wheels as are found on the truck's predecessor, the LX-T, are carried over to the Double-XT, but a set of new, offset wheels are used up front to compensate for the truck's super-wide stance. The truck also includes an eye-catching new body that fits so tightly that it looks like it has been vacuum-formed over the chassis.

BLUEPRINTING A WINNER

The Double-XT's instruction manual is among the best in the business. The pages are filled with excellent illustrations, exploded-view diagrams and life-size parts-identification charts that make building the truck an enjoyable experience.

The parts are well-organized in numbered bags, and each bag includes all the

Specifications

Scale 1/10
List price \$349.95

DIMENSIONS

Overall length 15.5 in.
Wheelbase 11 in.
Front width 12 in.
Rear width 12.6 in.

WEIGHT (gross, ready to run) ... 4lb., 2 oz.

CHASSIS

Type 3-piece modular
Material Molded composite Stiffezell

DRIVE TRAIN

Type Sealed gear drive with
2.61:1 reduction
Primary Pinion/spur
Transmission 3-gear Double-X tranny
Differential Racing ball diff
Slipper clutch Friction with Hydra Drive
Bearings/bushings Sealed ball bearings

SUSPENSION (F/R)

Type Independent A-arm with adjustable
camber link
Damping Oil-filled, coil-over shocks

WHEELS (F/R)

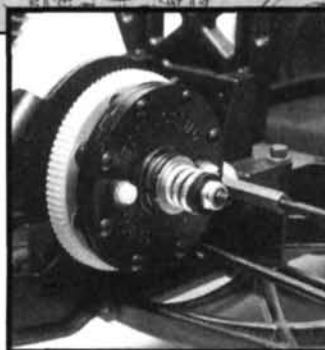
Type One-piece plastic with
Lexan dirt shields
Dimensions (DxW) 2.2x2 in.

TIRES

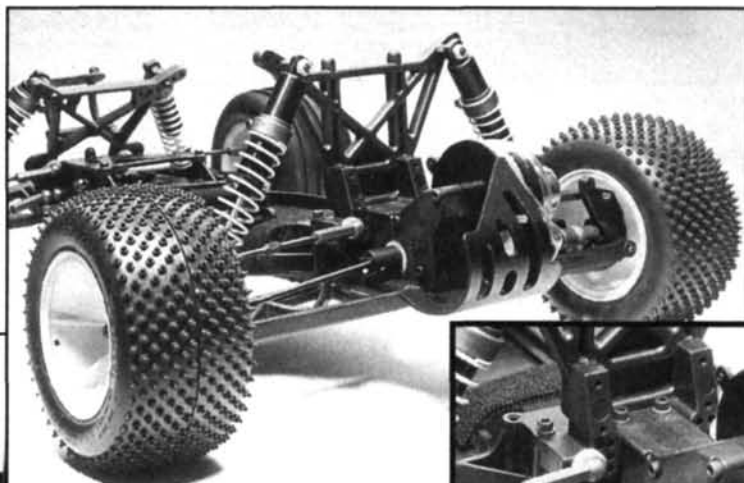
Front HT ribbed
Rear Gold-compound step-pins



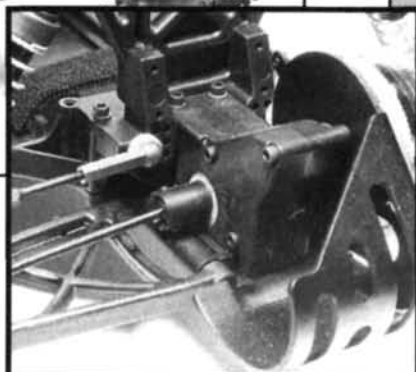
necessary parts and screws to complete a particular section in the instruction manual (no sifting through screw bags, or left-over parts with this kit!). The manual also includes a glossary of R/C terms and an informative section titled, "Tips from the Team." This section includes tips on: front toe-in/out; rear toe-in/anti-squat; front and rear ride height; shock and camber rod mounting locations; ackerman and adjusting the ball diff and slipper/Hydra Drive. Such information is crucial for beginners



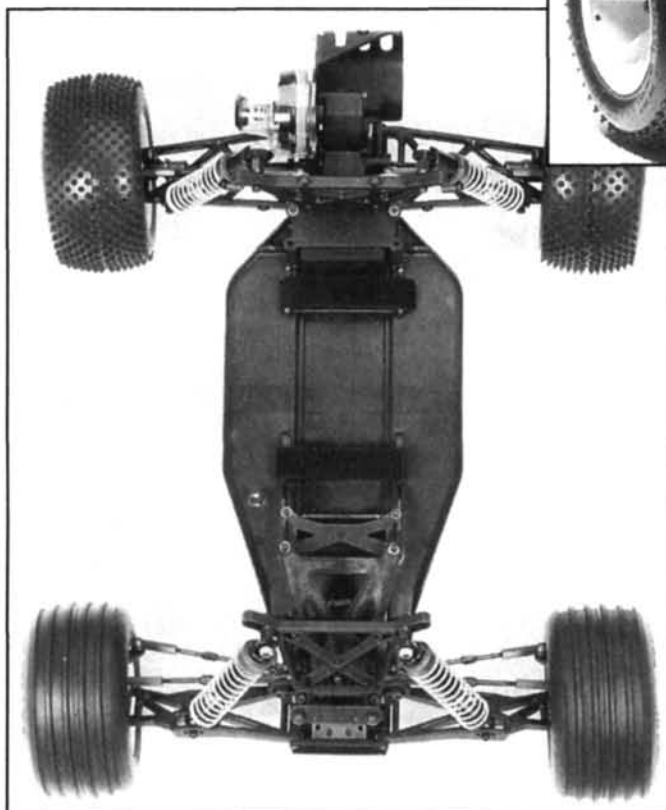
Team Losi's Hydra Drive unit is standard. By removing a few screws from the rear-end you can remove the entire rear-end assembly from the chassis.



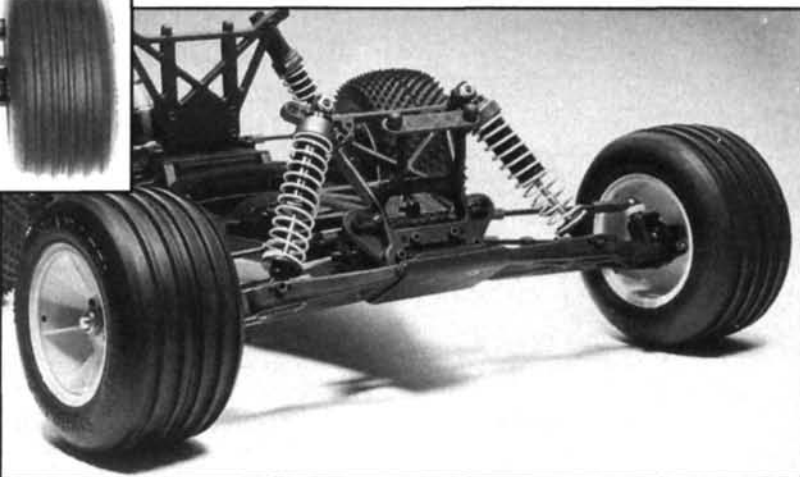
Above: extra-long suspension arms and Hard Body shocks are also visible from the rear. Gold-compound Step Pin tires help grab rear traction.



The Double-XT's tranny has a 2.61:1 drive ratio, and its case has been reconfigured for a lower center of gravity. Molded shock towers have proved extremely durable. Camber-rod placement holes abound on the rear bulkhead.



Below: from the front, you can see that the truck has long, rigid suspension arms as well as the company's hard-anodized Hard Body shocks. HT-ribbed front tires help the truck carve the right line around the track.



The Double-XT's instruction manual is among the best in the business. The pages are filled with excellent illustrations, exploded-view diagrams and life-size parts-identification charts that make building the truck an enjoyable experience.

and provides useful points of reference for experts.

The kit's parts are of the highest quality and fit together extremely well. Because of the truck's sophistication, however, beginners might need to call on a more experienced modeler for help with certain steps (especially steps that involve attaching the swing-away front end and building the diff, slipper and Hydra Drive).

Team Losi offers an excellent factory-support program, which includes the

"Tech Talk" columns in every issue of *R/C Car Action*. Every month, Team Losi reveals some hot new setup tips that have worked successfully for their factory drivers. Team Losi also uses these columns to inform racers about the latest and greatest products that enhance the truck's already superb performance. If all that's not enough, you can call Team Losi directly and talk with the factory drivers about which setup would be best for your particular track.

The Double-XT has won countless national titles around the world and is sure to win many more. I've been racing my Double-X buggy for more than a year, and I'm impressed with its handling, speed and reliability. After building and testing the Double-XT truck.... Well, you know the rest.

* Addresses are listed alphabetically in the Index of Manufacturers on page 166.



Honda FourTrax 250R

by KEVIN HOLMLUND

MINI ATV MADNESS!



Aluminum U-channel is used in the swing-arm and to mount the suspension links on the frame.



The sprockets and chain are from a Xerox copier donated by my employer, Data Inc. The gearbox cover was vacuum-formed with wooden pieces placed to resemble a full-scale engine.



PHOTO BY KEVIN HOLMLUND

SOMETIMES, I THINK I bought my 4-wheel ATV—an '89 Honda FourTrax 250R—so that I'd be able to make a scale model of it. During the first week, I took the body off to take pictures of the frame, and I used a copier to enlarge the pictures and make a template in 1/4 scale. After trying four times to bend 3/8-inch-square aluminum rod to match the template for the frame's two main sections, I was successful. Next came an angled piece on which the upper A-arms are

mounted. These pieces are held together with 6-32 screws. The A-arms were tricky; I drilled a 3/8-inch hole through the side of a 1-inch-long piece of 1/2-inch-diameter aluminum rod; while holding the 1/2-inch piece in a vise, I inserted a 4.5-inch piece of 3/8-inch-diameter rod into the hole and bent it to make the arm's "A." Before bending it, I used my Unimat lathe to tap 10-32 threads in its ends. The tie-rod ends are from Pacesetter*.

THE POWER OF PROPANE

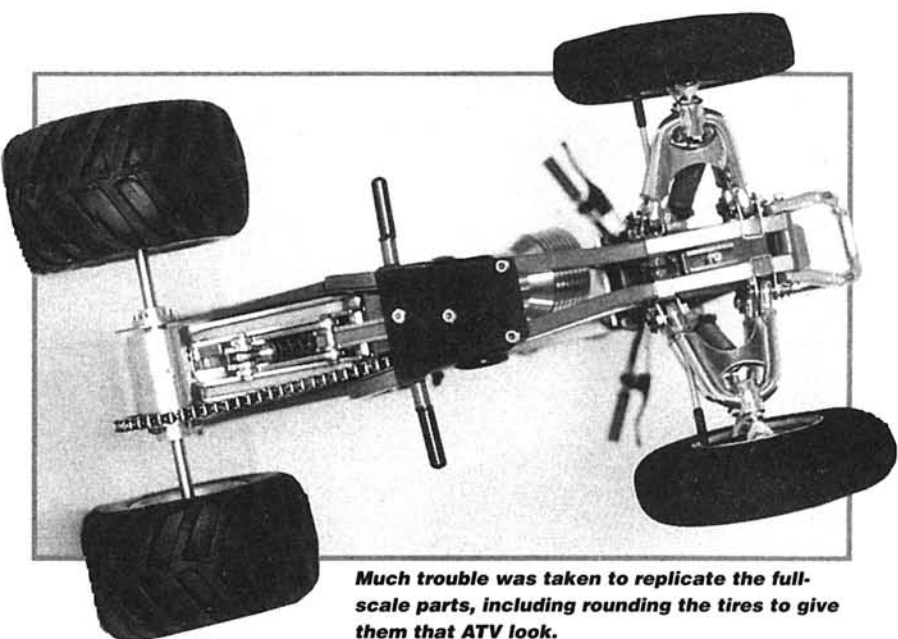
The swing arm was the next challenge. Not until I found some aluminum U-channel of just the right size did I really get moving on this part. The U-channel gives the swing arm a realistic look that I wanted for this project. Inside the rear housing for the axle is another aluminum housing that holds the bearings. The hole for the axle was drilled off-center to allow the chain to be adjusted. To keep these aluminum pieces together, I joined them with Dura-Fix aluminum welding rod. Using a propane torch, I melted the aluminum pieces together, so the unit is very strong. I used the same U-channel to mount the rear suspension link and the shocks on the frame. The Pro-Link rear suspension has the same action as the full-scale ATV. The shocks are from Associated*, and I dipped the springs in red plastic and stripped and polished the shock bodies.

The rear axle is a drill-bit extension with the ends cut off and threads cut in it to take the Big Brute wheels and tires. To make them look more like ATV tires, I used my lathe to round the corners.

The front tires weren't as easy; I couldn't find anything that looked right, so I cut a foam Clod Buster tire in half. For the wheels, I used tuna-fish cans with the top and bottom cut out. I turned 1/4-inch-thick aluminum plate to make the wheel centers and 1/2-inch-thick plate to make the hub. I mounted the centers inside the cans with 4-40 screws, then I glued the tires on and trued them with sandpaper on the lathe.

GETTIN' GEARED

I needed to come up with a gearbox that would have enough torque to move this



Much trouble was taken to replicate the full-scale parts, including rounding the tires to give them that ATV look.

heavy—and getting heavier—machine. I wanted to make it look realistic, so I positioned the motor at an angle to the final drive shaft, like the cylinder of the real engine.

Thanks to Jerry at Slot Car City, I used the bevel gears from a Turbo Burns differential. The Monster Mash II motor with a 10-tooth pinion turns a 41-tooth gear that's connected to a shaft that has the 15-tooth bevel gear on the other end; this bevel gear drives the 43-tooth bevel gear that's bolted to a shaft that has the 12-tooth sprocket that drives the axle's 30-tooth sprocket...and this bone is connected to that bone and...never mind. If my calculations are correct, the final drive ratio is 29:1.

The steering column has tie rods attached to the bottom and handlebars on

top. When the wheels are turned, the handlebars move in the corresponding direction—looks cool. The battery, receiver and ESC are mounted under the seat and gas tank. The steering servo is mounted in the same place as the radiator, so the only hint of R/C is the antenna, which some ATVs use when beach riding.

BODY BOTHER

It has been over a year since I started this project, and I haven't come up with an acceptable body. My first 1/4-scale project (chosen as a June 1990 "Readers' Ride") has a foam body that, from a distance (quite a distance!), looks OK, but up close looks silly. For this project, I had to come up with something better.

I took pictures of the full-scale body at several angles and again enlarged them to

SPECIFICATIONS

HOLMLUND QUARTER TRAX

Scale.....1/4
Investment.....\$350+

DIMENSIONS

Overall length.....18.5 in.
Wheelbase.....12.5 in.
Track (F/R).....10.5 in./11.5 in.
Ground clearance.....1 in.

WEIGHT (gross w/ batteries).....9 lb.

CHASSIS

Type.....Homemade
Material.....3/8 in. aluminum

DRIVE TRAIN

Type.....Gears/chain
Primary.....Pinion/spur
Differential.....None
Bearings/bushings.....22 bearings

SUSPENSION

Front: Type.....Upper/lower A-arms
Damping.....Oil-filled, coil-over shocks
Travel.....2 in.
Rear: Type.....Honda Pro-Link 1/4 scale
Damping.....Oil filled, coil-over shock
Travel.....2.25 in.

WHEELS

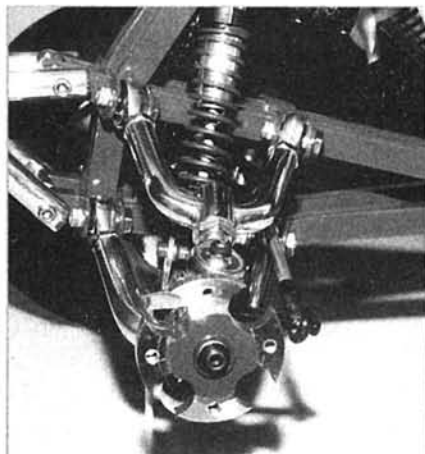
Front: Type.....2-piece aluminum/steel
Dimensions (DxW).....2.625x1.5 in.
Rear: Type.....3-piece plastic
Dimensions (DxW).....2.625 x 2.875 in.

TIRES

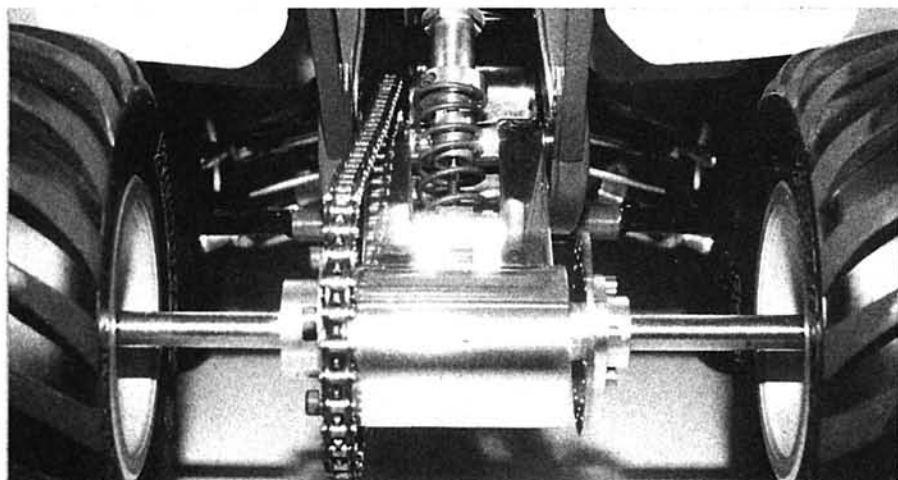
Front.....Foam
Rear.....Big Brut Paddle

ELECTRICS

Motor.....Monster Mash II
Battery.....6-cell 1200 SCR
Speed controller.....Novak 610 HRV ESC



The ball joints are from Pacesetter; the shocks are from Associated. Note the extra spring on the shock shaft; it helps to prevent the ATV from bottoming out.



For scale realism, the chain is mounted inside the frame. The alignment is slightly off, but this hasn't caused any problems.

The Turbo Burns bevel gears allowed me to make the gearbox as much like its full-scale counterpart as possible.



1/4 scale. I bought a big block of basswood and began to carve a model of the body to use as a mold. My first idea was to layer fiberglass over the wooden body, but before I had made a complete mess of my workshop, my solution came from an ad for a guide on the pages of an R/C magazine we all know and love. The ad read: "Make your own Bodies, by Douglas E. Walsh." This was just what the doctor ordered!

The guide tells you everything you need to know about vacuum-forming—everything from making the vacuum box to the temperatures you need to heat the plastic. I really lucked out on the plastic I used: white styrene is one of the best for forming details, and it's inexpensive. Most suppliers of plastic sell it, and a 0.060-inch-thick sheet will make five bodies for less than \$20.

A week after receiving the guide, I formed the first body. I hadn't finished my wooden mold, but I couldn't wait to try. It was wild to watch the hot plastic being

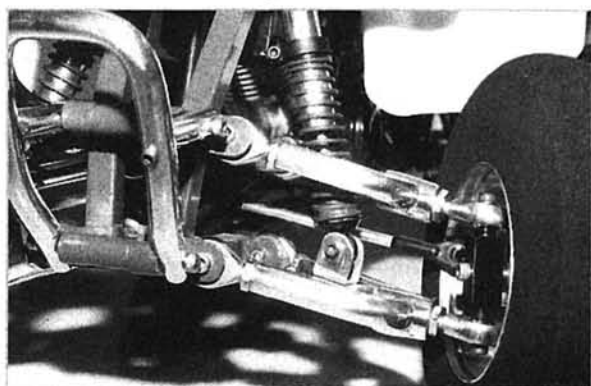
sucked down on top of the mold—every nook and cranny showed.

With a lot of chiseling, sanding and filler, I eventually had a good replica—a miniature of my ATV body. Velcro®-brand fastener holds the body on the frame. I also vacuum-formed the gearbox cover.

GOTTA GAIN CONTROL!

For control, I have a Futaba® Magnum Junior radio, and the steering is handled by a Hitec® high-torque servo, Novak's NER-2X mini receiver and 610 HRV ESC. There are a total of 22 bearings in this little ride, 12 of them in the rear swing arm. With the exception of the rear wheels/tires, gears/chain and shocks everything is handmade.

So after 500+ hours, I have a little 9-pound 4-wheeler I can buzz around my townhouse. It can't pull a wheelie from a standstill, but on carpet, a slight dab in reverse will stand it up on the rear bumper. With a little practice working the trigger, it will ride a wheelie. It's amazing how much it handles like the real thing as I slide it around on my basement floor. Watching the handlebars helps me to keep the rear end loose as it slides through a turn. The suspension works



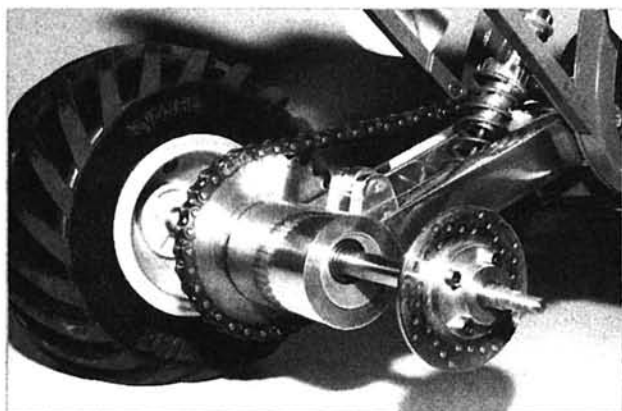
The turnbuckle is made of the same material as the frame; the wheels were once tuna-fish cans.

well, too; I stacked five video tapes to make a jump, and it was awesome to see it level out in the air and land on all fours.

But the real test came at Hobby Hangar Speedway, in Chantilly, VA, where we headed to take some action photos. It had no differential, so spin-outs were common, and any sharp turns rolled it over. The Quarter Trax seemed right at home over the jumps. The suspension soaked up every landing and asked for more. The high-torque gears make it quick off the line, but top end isn't true to scale. I could use a larger pinion, but I figure that the faster I go, the more damage I'll do if I hit something (and with this project, I can't go to the local hobby shop for replacement parts).

Thanks to Bonnie Canter at Ridgeview Glass in Maryland for supplying me with aluminum materials and Gary Bream for the use of his wood shop.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.



The hole for the axle is off-center to allow the chain to be adjusted. The disk rotor increases the model's "realism." The all-aluminum swing-arm has been welded and polished.



Left to right: Protoform's Dale Epp, GMC Motorsports racing director Tom Klipstine and Don "The Snake" Prudhomme at the presentation ceremony just hours before "The Snake's" last race.

BUILDING THE Snake's Ride

The 1/6-scale masterpiece sits on a carbon-fiber base. A high-gloss surface on the carbon fiber reflects the image of the dragster.



PHOTO BY GARY LAMBERT

Don Prudhomme's record-setting rail in scale...

by MIKE OGLE

BEFORE YOU START to look for an antenna and radio gear on this dragster replica, let me save you some trouble. This dragster isn't powered by a gas or electric motor. It is, however, a piece of "auto-art" that we thought you readers would like to see. You might still wonder, "Why is a static model in this magazine?" It's great when R/C industry people are recognized by those who are involved in full-scale auto racing. This Top Fuel Dragster is a prime example of the attention our industry has received of late.

THE SNAKE

It's hard to be brief when describing the racing career and achievements of drag-racer Don "the Snake" Prudhomme. With the possible exception of Don Garlits, there's no greater drag-racing legend than the Snake. During his brilliant 30-year career, he won 49 national titles in funny-cars and dragsters and destroyed the national ET and speed records with unbelievable consistency. Don decided that 1994 would be his last season as a driver. Ironically, the 1994 racing season was also the farewell tour for Mario Andretti and Harry Gant. As good as both Mario and Harry are, they struggled to achieve even a top-10 finish last year. Meanwhile, the Snake's performance during his Final Strike Tour was simply awesome because he still won races and set records. He ended his last season with four more victories: second place in the points chase and best performances of a 4.73 second ET and 303mph.

At every event in the 1994 tour, Don received retirement gifts and mementos from friends and sponsors. Midway through the season, GMC Motorsports, who supported the Snake's race team for the past 15 years, commissioned Protoform* to build a scale replica of Prudhomme's last "ride." They wanted to give Don something special in recognition of his racing efforts throughout their long and rewarding relationship. They also invited Protoform's

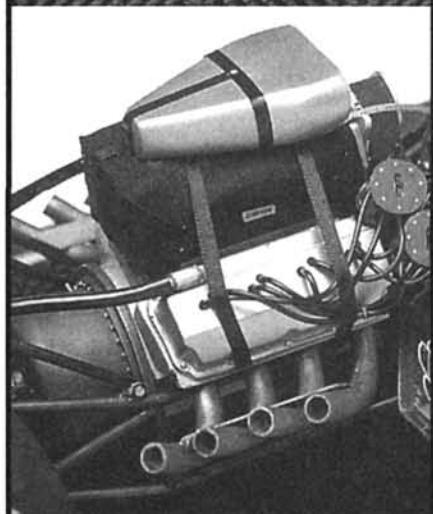
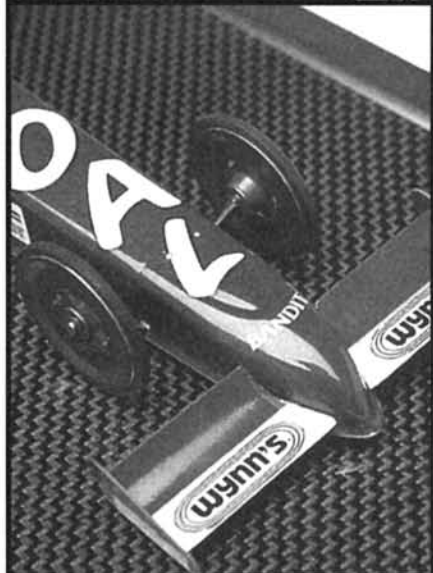
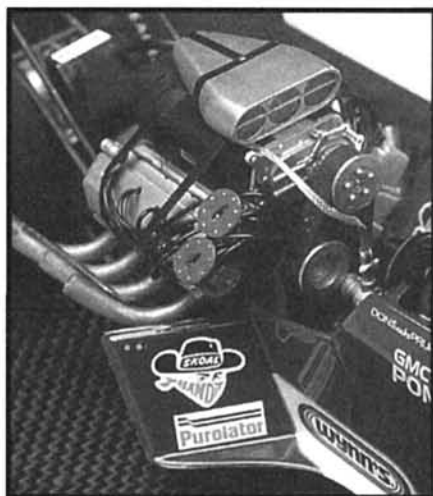
president, Dale Epp, to join GMC's racing director, Tom Klipstine, for the presentation ceremony held in Pomona, CA. It took place on the starting line at NHRA's world finals event—just an hour before Don's last 1/4-mile blast.

RETIREMENT MEMENTO

For a couple of reasons, this was just the kind of project Dale could really "sink his teeth into." He simply loves fuel dragsters and NHRA drag racing. He also happens to be a big Prudhomme fan. This, together with his obsessive attention to detail, enabled him to create something that he hopes the Snake will cherish for years.

Dale's biggest challenge was that nothing was available in 1/10 scale that even vaguely resembled Don's 1994 Brad Hadman dragster (with its 300-inch-long wheelbase and 6,000hp Keith Black hemi engine). His existing Protoform dragster bodies were designed for R/C cars, and that meant they were just too short. The only scale engine available was a 25-year-old Parma* hemi. He was able to use the Parma engine block, blower pulleys and bell housing, but everything else had to be built from scratch. A new 1/11-scale body mold had to be made just to produce one body. (As I said, he took this pretty seriously.) Why 1/11 scale? Well, these dragsters are so long that a 1/10-scale mold just wouldn't fit into his oven.

After taking photos and measurements of a Hadman digger similar to the Snake's, Dale drew blueprints of the proposed car, and then he made a jig to construct the tube frame. To create the clean look of the "tig-welds" on the real chassis, Dale made it out of brass tube that he silver-soldered together, taking care to use as little solder as possible. He made the wing struts and front A-arms out of homemade teardrop-profile tubing. To give the look of bare chromoly, he painted the chassis with Testors* "metalizer" lacquer. The front and rear three-element wings were shaped out of maple. The Chrisman differential, the rear-axle



A tremendous amount of work was poured into this project; notice the detail on the engine alone. Also, look at the front wing; can you tell it was shaped out of a piece of maple?



WINNING WITH NOVAK!

When you look at the results of any major race, it's no secret that Team Novak dominates the field. However, there is more to winning races than just having the best speed controls...

We're There!

A Novak representative attends more national and world-level events than any other speed control manufacturer.

We provide support to ALL RACERS using Novak speed controls, and not just a few sponsored drivers. We feel it is very important to support our customers at the races when they need it. Also, first hand contact with racers helps us develop new and better products, as well as improve existing products.

We're Here!

If you have any questions or concerns about a Novak product, our knowledgeable Customer and Product support staff is only a phone call away. At Novak Electronics, customer service and satisfaction is our primary concern.

If it becomes necessary for you to return a Novak product for service, our service turn-around time averages between 4 and 5 working days from the time we receive the product to the time it leaves our facility.

We're Behind You!

We stand behind you by standing behind our products and service. Both new and serviced products carry the same 90 day warranty.

We're Everywhere!

With more National and World titles than all other speed control companies combined, Novak is dedicated to providing the best speed controls with the best service and the best prices.

It's no secret why so many people are winning with Novak!



Team Novak welcomes your comments and secrets!

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18910 Teller Avenue, Irvine, CA 92715
• (714) 833-8873 •

Advertisement



The rear-wing struts were made out of a homemade teardrop-profile tubing. The wing itself was shaped out of maple. The rear drag slicks took eight hours each to make, and they're mounted on bead-lock rims that were made by BME.

assembly and the reverser were made out of aluminum and plastic that he turned on a drill press. Dale pirated the carbon-carbon brake rotors and calipers from a 1/12-scale Tamiya F1 Lotus. The jewel-like aluminum wheels were made (to Dale's specs) by another R/C manufacturer, Bruce Mack of BME*. The rear bead-lock rims were mated to massive rubber slicks that each took eight hours to make.

After the Parma hemi "short block" had been downsized slightly and updated to 1994 specs, Dale made a longer supercharger and covered it with restraints and a ballistic bag. He resin cast the contemporary 16-plug rocker covers as well as the Enderle "buzzard catcher" injector. To give them the "Dow 7" look, he painted them with Testors "magnesium metalizer" paint. Dale fully wired the handmade dual magnet and added a few braided-steel fuel lines. So the engine wouldn't look too cluttered, he refrained from putting on every last line and linkage. A simulated carbon "puke tank" at the rear has breather tubes to vent the rocker covers. At the extreme rear, he fashioned the dual-parachute packs complete with straps and Simpson-brand logos. The finished car was 36 inches long.

Bodies*. Scott did a superb job of replicating the Prudhomme car right down to the Dzus fasteners on the individual body panels. A company called Computer Imagery* duplicated every logo and sticker found on the real racecar, including the Final Strike logos. Even Don's helmet was duplicated with all the many stripes, names and logos.

To display the finished project, Dale contacted fellow R/C manufacturer Kim Davis at Advanced Design Concepts* (home of the Composite Craft line) to have his company lay-up a carbon-fiber base. Kim put a special high-gloss surface on the carbon fiber, not only to enhance the woven pattern, but also to reflect an image of the dragster replica. Dale then framed this with gray-anodized aluminum and made an engraved plaque to complete the high-tech project.

Dale thanks Scott Bich, Bruce Mack and Kim Davis for their high-quality work. He's also grateful to GMC Motorsports for having allowed him to participate in Don "the Snake" Prudhomme's Final Strike celebration.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

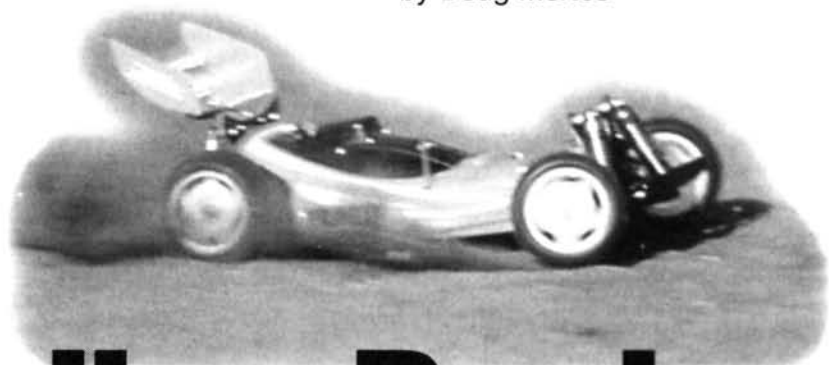
FINISHING TOUCHES

The body was sent out to one of R/C's supreme paint artists, Scott Bich of Bich'n

HOW TO

Wing and Spoiler Basics

by Doug Mertes



Feel the Downforce, Luke!



F1 and Indycars are known for their distinctive, high, rear wings. When it comes to downforce management, designers of these cars are masters of airflow. Note the multiple wing planes, the variable angle of attack on the upper wings and the dual-anhedral wing on the McLaren Marlboro car. Not only does this wing efficiently strip the laminar airflow from the trailing edge of the body, but it also increases straight-line stability without your having to use large side plates. The angled middle planes create centering force as well as downforce.

ONE-TENTH SCALE, $\frac{1}{12}$ scale and $\frac{1}{8}$ scale. Electric and gas. On-road, off-road, stock car, stadium truck and buggy. As different as all these R/C vehicles are from one another, virtually all of them have in common some sort of rear wing or spoiler. Do you know which one to choose for your particular application?—or how to mount, tune, or adjust your wing for maximum performance? Well, kick back and take your shoes off, bud, 'cause we're going to lay it all out for you. After you've read this article, you'll be the wing-ding wang-dang doodlemeister of your track, and fellow racers will line up at your pit to witness your wisdom!

WING TUNE-O-TRONIC

Which wing should you choose? Most off-road car kits come with a wing. Most drivers stick it on the back of the car where they think it should go and learn how to drive with it that way. Sometimes, they even bend it upward or downward to see what happens. The smart folks are those who experiment with wing-mounting methods, wing angles and wing designs. Given the same wing position and angle of

attack (the number of degrees the wing deviates from horizontal), using a smaller (shorter or narrower) wing will give you less downforce. It will also weigh less and produce less parasitic, speed-robbing drag.

Some wings have several planes, every one of which is adjustable. That allows you to tune the wing's downforce a little at a time, so that you wind up with the result you want without having to switch to another wing altogether. Other wings have large side plates that increase straight-line stability, but they can also make it tough to swing the rear end around on fast turns. There are even wings—such as the BRP* no. 5237 and no. 5241—that have both several planes and large side plates. These give you a lot of tuning latitude by allowing you to cut away the side plates until the stability feels just right. Then you adjust the upper plane until the downforce is just what you need.

How do you know when you've gone too far with your wing-tuning efforts?

- Too large a wing produces understeer, particularly when you enter a turn at the end of the straight, when the car's velocity is highest. You'll also notice that the car

WINGO-BASICS

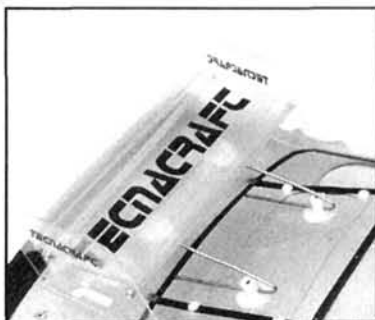
What we usually call "wings" in the world of R/C cars are actually elevated spoilers. Real wings (like those on airplanes and helicopters) have curved, teardrop-shaped cross-sections that create lift. Because they're made out of flat sheets of Lexan, most of the wings you see on R/C cars and trucks have flat cross-sections, so they don't produce any lift. Instead, they channel, divert and spoil the airflow in such a way that they produce downforce. Some even enhance straight-line stability when large side plates are used.

Because elevated spoilers rely on heavy airflow volumes to be effective, they have to live in a clean, unrestricted air stream. If your stock-car wing is hidden on the lee side of

the rear window, it won't produce much downforce. Likewise, make sure that the wing on your off-road car isn't stuck too low behind the rear shock tower, or your car will spin out easily in fast turns.

Some true, airfoil-type wings have been adapted for scale R/C use, and they're very effective when used properly. Of course, they're mounted upside-down compared with an airplane wing, because we don't want them to produce lift; we want downforce instead. Airfoil wings tend to be shorter and narrower than flat wings, but they weigh a little more owing to their complex folded or molded nature. Full-scale outlaw sprint cars use very large airfoil upper wings, but I have yet to see one available for $\frac{1}{10}$ scale use.

PHOTOS BY DOUG MERTES



This Protoform Pontiac Grand Prix body has a narrow Tecnacraft* no. 50050 airfoil wing mounted on the back window. It's down out of the airflow a little, but it still provides sufficient downforce without causing too much drag. This body produces a lot of steering, and the rear wing balances that tendency.

Sedan cars need lots of downforce for dusty, dirty, parking-lot surfaces. These DTM-type cars have large, multiple-plane spoilers mounted directly on the rear of the body.



The side plates are very small, so the cars can make tight turns without losing speed.

On freshly vacuumed carpet tracks or slippery surfaces, the rear BRP no. 1215 TOJ 1/12-scale stabilizing wing on this BRP no. 1002 Nissan R91CP body gives you additional rear downforce. Its lightness won't slow you down!



This Protoform* Lumina stock car body has a BRP no. 5240 Pro-Flow wing mounted with heavy wires that come back from the roof (the BRP no. 5246 kit has all the parts you need). It puts moderate downforce on the rear body-post area instead of on the rear pod. On one track, my lap times dropped by 1/10 second when I used this wing-mounting method.



isn't as fast as it should be on the straight, because the wing is causing too much drag.

- You need a larger wing when your car or truck spins out easily, even when it's equipped with the proper tire, shock and spring combination. If your car steers too easily or seems twitchy in a straight line, it's probably time to look at the rear wing. There's too much downforce on the front end, and a wing is one of the tools you have to fix that problem.

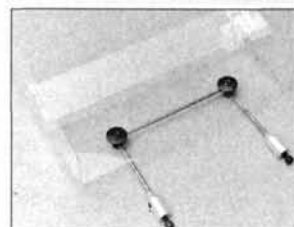
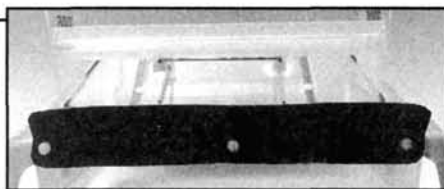
Stock cars use wings to balance the chassis and provide stability. Various body styles result in varied front-end downforce and, therefore, varied steering sensitivity. A rear wing that's properly adjusted allows the driver to balance front and rear traction and to walk that fine line between "loose" and

"too loose" that makes the fast guys really fast.

Carpet-roadcourse cars, especially 1/12-scale pan cars, use spoiler-type wings attached to the rear of the body shell. These increase or decrease rear traction a little at a time and allow you to make fine steering adjustments. Pay attention, though! Too much drag can make you dump before the 8-minute bell, and too much weight makes your car slow and lazy in the turns. Because 1/12-scale racers are fanatics about fractions of ounces, you see a lot of really simple, yet innovative, airflow design work here.

Let's take a look at some examples of wing types and various mounting configurations. I think you'll get some idea of how to improve your car's performance by doing the wing thing!

It's a good idea to bolt the rear spoiler to your car or truck with some of these BRP no. 7570 nylon 4-40 screws and nuts. They're light, reusable, virtually indestructible, and they won't rip off like servo tape will.



The BRP no. 5238 adjustable bi-level racing wing is a great addition to your off-road arsenal. It's also available in a smaller version—the no. 5239 mini. These new Trinity* no. 6011 wing buttons have a piece of straight wire between them that's held on with one pair of setscrews. They also have two L-shaped pieces of mounting wire that are attached with another pair of setscrews. Because of this setup, you won't have to bend and measure a single piece of wing wire, and you'll be able to mount your wing straight. I used BRP no. 5245 horizontal wing mounts. They can be bolted directly onto the rear shock tower of my off-road car. Solid!

The large center portion of the upper wing on this outlaw sprint car should have an airfoil cross-section. Unfortunately, nobody makes them...yet!



When it's attached directly to the rear pod, this wide Tecnacraft no. 50070 wing is ideal for on-road applications. It yields maximum downforce and minimum drag, and it has medium-size side plates that allow fast cornering. Use it with GTP body styles.

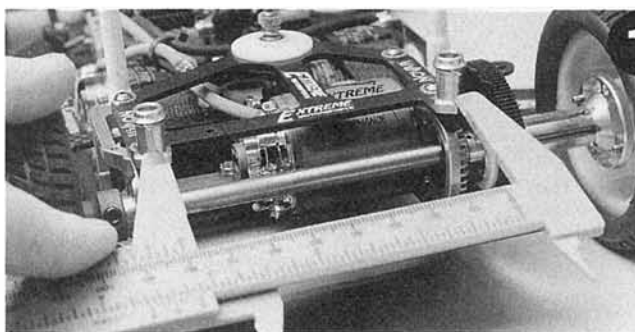
The BRP no. 1216 1/12-scale Slat Spoiler on the back of this BBR* Lotec body can be adjusted a little at a time to increase or decrease rear downforce as the track becomes stickier. Don't change bodies; adjust your spoiler!



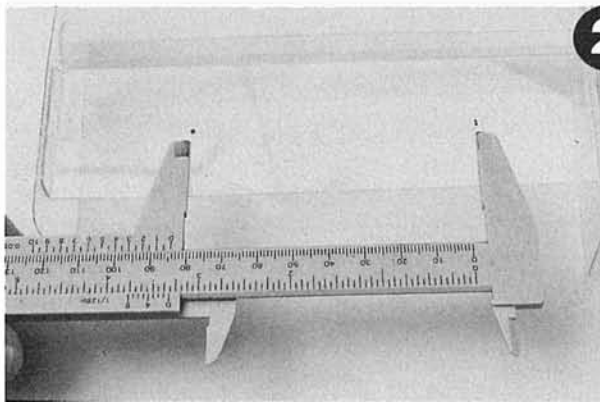
MOUNTING METHODS: DOIN' THE WING WIRE BENDORAMA

Do you have a twisted, misshapen wing wire hanging off the back of your car? Follow these easy directions for a neat, strong wing mount that will make you the envy of your pit mates!

This might be a good time to check out the two-piece no. 50200 wing mounts made by Tecnacraft. One part is fastened to the end of the wing wire, and it plugs into the socket pieces that are screwed to the pod or shock tower. No more last-minute scrambles looking for your pinion wrench. Instead, you just push the small wire spring, and the wing comes right off. Easy!

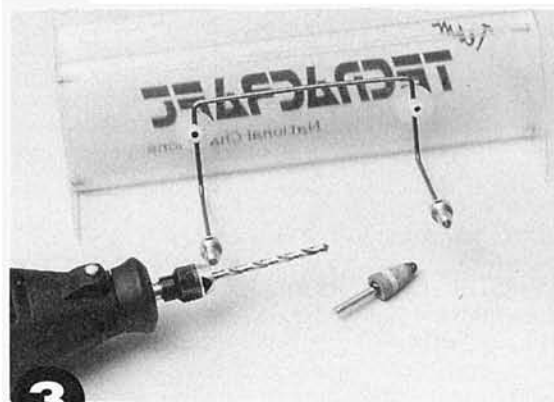


1 If there are mounting tabs or holes on the back of your car's shock tower or pod, measure the distance between their centers.



2 Transfer that measurement to the mounting plane of your wing, and make sure that the marks are equidistant from each side so the wing will be centered properly. You also need to decide how far the wing button will be mounted from the leading edge. This is less critical because

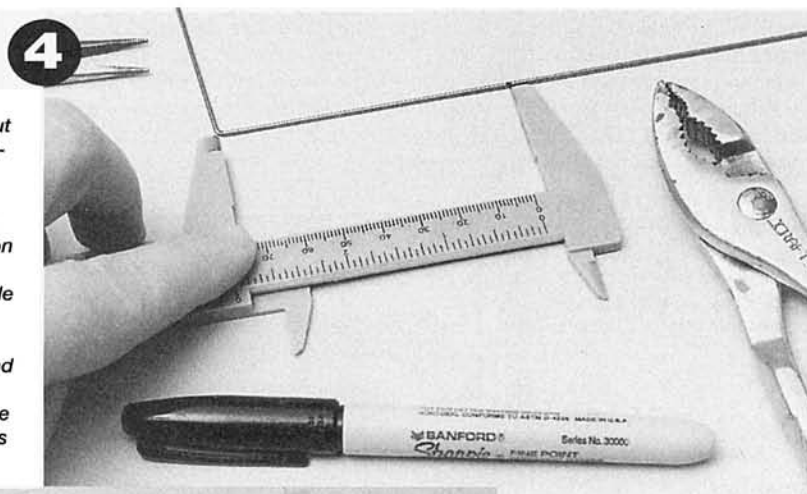
you can always adjust the front-to-rear distance later by sliding the wing forward or backward along the wing wire. Placing it farther back gives you more leverage and more downforce.



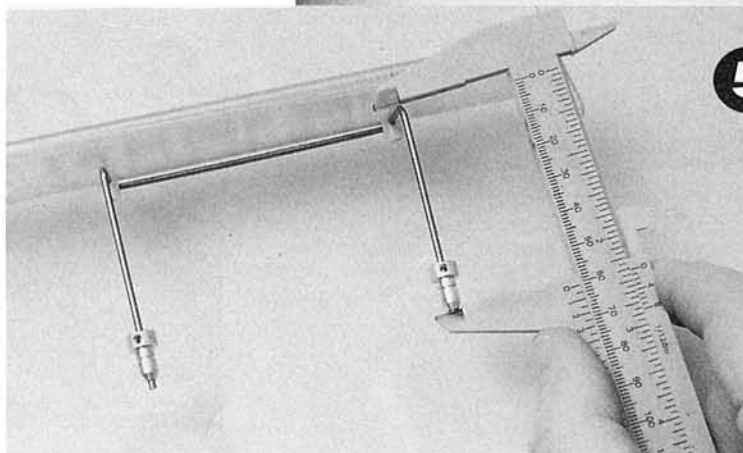
3 To start a pilot hole, use a drill bit that's smaller than the wing button shaft. Then use a small tapered stone on a rotary tool to enlarge the hole a little at a time until the button shaft just barely slides through. I

used BRP no. 5248 buttons; they're tough and light.

Now bend the wing wire. Start with an 18-inch piece, and make a 90-degree bend about halfway along it. Use a permanent marker to transfer onto the wing wire the mounting-hole distance that you put on the wing. (It's best to use two pairs of pliers when you bend wing wire. That way, you'll get nice, even curves with no wavy spots, and the wire will bend exactly where you marked it.) Having bent the wire, lay it on a flat surface and correct any "tweak" between the left and the right wire legs. Slide the bent wire through the holes in the wing buttons, and temporarily tighten the setscrews that hold the wire, the buttons and the wing together. You can adjust the wire more easily after it has been mounted on the car. You can make the wire-bending process a lot easier by using pre-bent wing wire, such as BRP no. 5247.



4

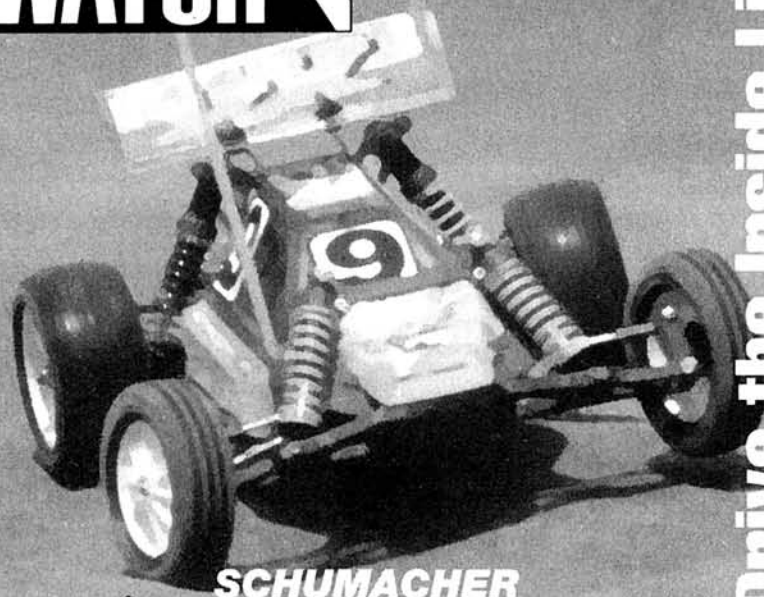


5 If necessary, bend the wire down to form the legs now, and make sure that both bends start at the same distance from the wing's leading edge. You probably have two legs that are of slightly different lengths. Cut them to the same length with a pair of side cutters or a cutting wheel on a rotary tool. Be sure to file the ends flat so that they'll easily fit into the wing mounts.

That's it folks! Now, with all your new-found wing knowledge, you can go out to your local track and show all your racing buddies that you're a true "wing warrior."

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

**NEW
PRODUCT
WATCH**



Drive the Inside Line

Active Caster System for Losi Double-X

by Jim Knepley

SCHUMACHER RECENTLY introduced their new Active Caster System (SACS). Originally designed for the Cougar 2000 '95, the system is now available for Associated's RC10 and Losi's Double-X. Schumacher drivers speak very highly of the Cougar's new geometry, so I thought I'd give it a try on my fiancée, Shelley's, Double-X.

The angle of the SACS pivot pin is the key to this kit's geometry. It's at approximately 45 degrees to the chassis (the conventional caster-block style of suspension is a parallel setup). The tab that sticks out from the back of the arm is the wheel stop.



Schumacher's Active Caster System (SACS) allows caster to remain at a constant angle regardless of suspension compression. If you push down on the car's nose, the angle shown here won't change!

To understand how the Schumacher setup changes the car's geometry, you have to understand something about caster angles. Off-road cars have a chassis kick-up angle of 30 degrees, and that also provides a caster angle of 30 degrees. Most manufacturers provide blocks with which you can reduce the caster angle by 5 degrees or more to suit a variety of track conditions.

Generally, a lower caster angle (meaning the kingpin is more perpendicular to the ground) improves low-speed cornering but causes some "push" at high speed. A higher caster angle helps improve high-speed cornering and turn-in. For off-road racing, 25 to 30 degrees of caster is the norm. The problem with this setup is this: when the nose of the car dips in a turn, the caster angle stays steady with the car's nose and not the ground.

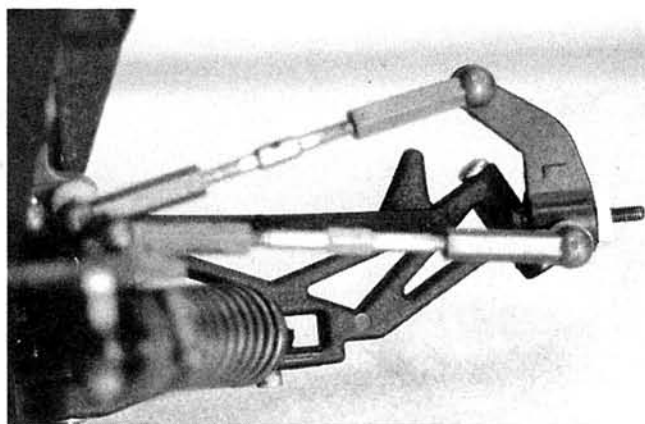
With the SACS, the caster angle increases as the suspension is compressed; caster is kept constant in relation to the ground. This allows my test Double-X to go into and come out of turns harder, especially off power.

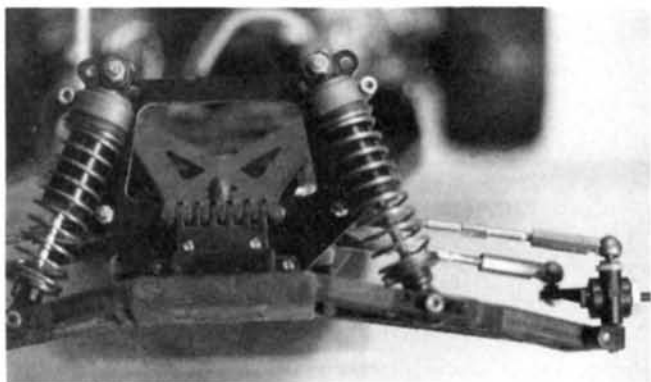
The kit (part no. U1618) includes a new front shock tower, front wishbones, new pivot and kingpins, replacement axles, screws, nuts and spacers. It's all packaged in one bag that lists for \$34.95. You'll also need a nut driver, an Allen wrench and a file or a Dremel* tool. The kit relies on the original wheel bearings, camber links and spindles.

CAREFREE CONVERSION

Assembly is straightforward; the half a page of directions clearly shows most of the steps you have to follow to convert the existing Double-X front end. A few commonsense things have to be done as well:

- It's important to file down the flashing on the shock tower before you install it. Apart from that, the shock tower is a direct replacement. On the new tower, there's only one position for the upper link; this





The replacement shock tower simplifies top-link adjustment significantly.

should simplify tuning, but I suspect that more experienced drivers will drill out new holes and experiment. There's no need to replace the existing camber links or ball studs.

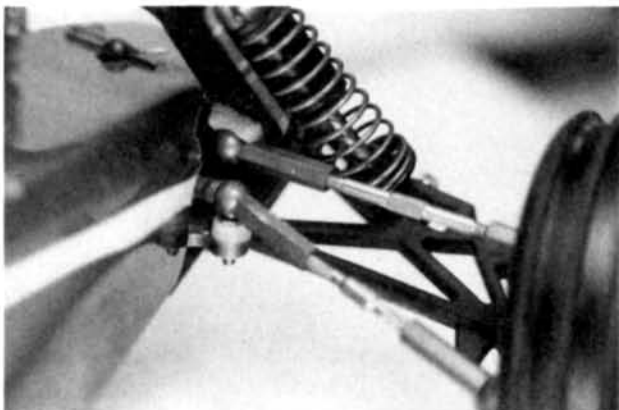
- One nice touch: a 3.2mm drill bit is provided to drill out the existing spindles. The drill bit is exactly the right size, but the ball-joint pivot pin fits very snugly—nearly a pressure fit. I had to enlarge the hole slightly to allow the pivot pin to move freely. I also found it helpful to drill a slight countersink in the pivot block to help the pivot pin thread in.
- The instructions say that "It may be necessary..." to install the provided spacers to avoid bump-steer. There's no "may be" about it; but the existing ball studs are too short for use with the spacers. The solution: use the ball studs from the original spindle carrier; they're longer and can take the additional 3.2mm of spacer.
- The diameter of the replacement axle is slightly larger than that of the stock one, so I had to drill out the front wheels slightly to make them go on more easily. The included drill bit accomplished this task nicely.

When the conversion had been completed, I put the original wheels back on and readjusted the camber and toe-in.

TESTING...TESTING...

Initial tests on carpet showed that the car now had a tighter turning radius, but we needed more space to test it properly. So, with an Extreme Motorsports* stock motor and World Class 1400s, Shelley and I headed off to the local

An additional 3.2mm of spacers was required to eliminate bump-steer. The spacers are included in the kit.



PHOTOS BY JIM KNEPLEY

indoor track. The track is smaller than most, so the new suspension would truly be tested.

The improvement was immediately noticeable. The car turned in a respectable radius and responded very quickly to corrections in turns. The Double-X jumped and handled rough terrain just as before.

After using up few batteries driving con-

servatively, we started to push to the limits of the steering—mostly trying to carry speed through turns. The throttle was more forgiving in sweepers, and tight turns were straightened out with refreshing ease.

Then it happened! Moving through a tight turn at almost three-quarters throttle, Shelley turned the car too tightly. There was a loud snapping sound as the car smacked the track's border tube; its pivot pin had broken. I substituted a screw (conveniently, just the right size!), and the car still worked. I could probably also use hinge pins in place of the pivot pin, but Schumacher doesn't recommend it. The replacement pins (no. U1714) are made of a stronger steel, and they're now included with all the kits. If you get an earlier batch, I suggest that you replace them. Since I replaced the pins, the car has taken some serious punishment, but it's still going strong.

The Active Caster System is one of the best performance-enhancing hop-ups I've seen. With its modified front end, the car's cornering rivals that of the best cars at my local track, and it has decreased my fiancée's lap times significantly. My advice? Look for the cars with SACS suspension and expect to give up the inside line to them.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

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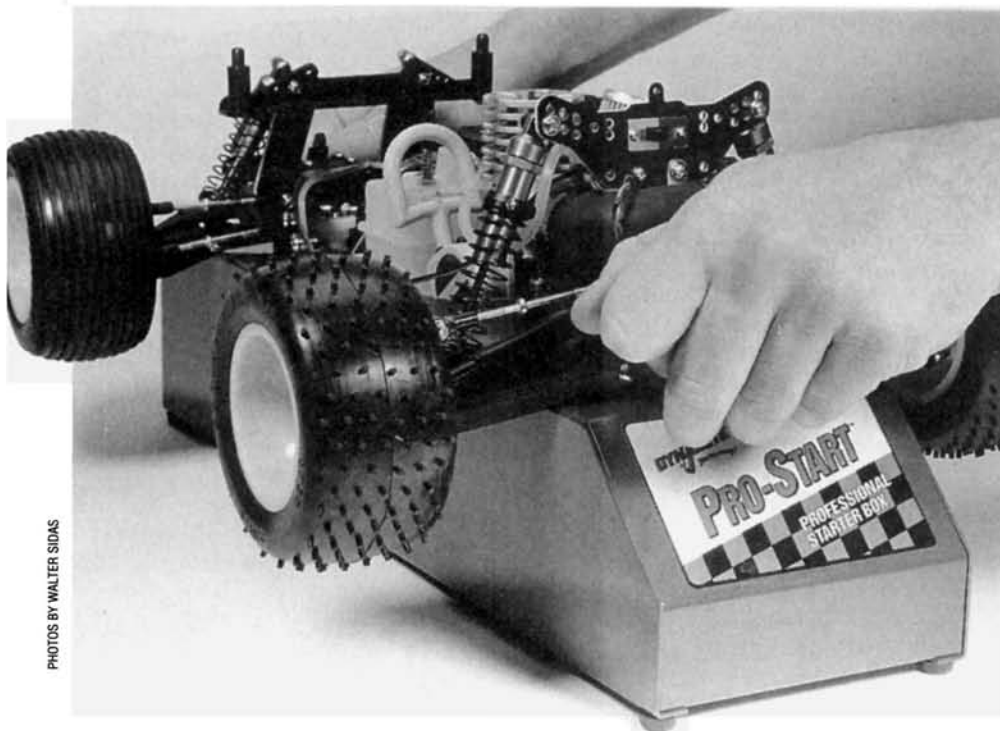
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PHOTOS BY WALTER SIDAS



DYNAMITE PRO-START STARTER BOX

by Jonathan Biebesheimer

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Dzzzdt,
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SOUND FAMILIAR? Well, if you have a pull-starter on your R/C gas car, you probably know the sound very well; it's the sound of repeated attempts to get your car's engine started! Although pull-starters are very convenient in that they allow you to start your car anywhere, anytime, there are many occasions when it sure would be nice to do away with the calisthenics you have to go through just to fire the engine up. Is there a way to do that? Sure there is! Get a starter box!



Dynamite's Pro-Start is a great addition to your R/C pit gear. I've always envied the guys who made starter boxes for their cars. But that takes a fair amount of designing, and I never wanted to deal with it. With the Pro-Start, Dynamite has already done the thinking for you. All you have to do is put it together, which is very easy and doesn't involve hours of labor and drawers of tools. The Pro-Start was designed specifically for several cars, but it can be used on any $\frac{1}{10}$ - or $\frac{1}{8}$ -scale car that has a side-to-side-mounted engine. I had been struggling with the pull-starter on

my Dynamite Apex 10 ($\frac{1}{10}$ -scale, on-road car), so I couldn't wait to start building the Pro-Start.

The fact that the instructions fit on two sides of a piece of paper made me feel at ease. The kit comes with all the parts you'll need except a power source, i.e., a battery of some sort. You'll need a Phillips screwdriver and a flat-head screwdriver, a socket wrench, a drill, a few drill bits and a hobby knife. That's it! One important note on the tools, though: as I found out, if you're setting up your Pro-Start to work with an Apex 10, you'll need one additional

DYNAMITE PRO-START STARTER BOX

drill bit. For the Apex 10, the starter switch must go in a different hole from the one that comes pre-drilled. The bit you'll need to drill the new hole is a 9/16-inch bit, although I used a slightly larger one and had no problems; just make sure the bit isn't larger than the nut that holds the switch in place.

First, prep the motor. Simply trim the end cap so it will fit flush against the side of the box, and drill two holes in the base of the motor through which the wires can run. The second step is the bulk of the work— assembling the box itself. After you've installed the rubber feet on the bottom, drill the holes needed to attach the alignment posts to the box. These posts act as guides for the car's chassis; when you plop the car down on the box, the starter wheel on the motor will line up properly with the flywheel.

Dynamite has made life easier by including a paper template showing the exact locations for drilling. Simply line up the template on the box, mark the correct holes for your car, and you're set to drill. I found that the best way to mark was to place the template on the box and tap a nail with a hammer at the correct spots. Once the holes

have been drilled, installing the posts and the starter switch is a breeze!

If you aren't one of the lucky ones who can use the template, don't panic! Just remove the engine from your car and position the chassis' flywheel opening directly over the Pro-Start's starter-wheel opening. After it has been positioned correctly, mark three places for the alignment posts. You must install at least one post in front of the car to prevent it from being launched forward when the starter wheel is engaged!

After you've attached the rubber wheel to the starter motor's hub (the rubber saves wear on the flywheel, and it can also be replaced as it gets old or worn), wire up the box! You can wire the Pro-Start in several ways depending on how and where you plan to use it. One option is to use an internal 12V battery, which can be mounted on the inside of the box. This makes the Pro-Start very mobile, but it means you'll have to have a charger on hand to keep the juice up! The other option is to use an external battery source, such as a *full-size* car battery (that's car as in *car*, not car as in R/C!). The instructions include diagrams for whichever way you want to go. After the Pro-Start has

been wired, be sure that the starter motor is turning the correct way. To do this, position the box so the Pro-Start label is facing you, and push down on the switch to make the motor start. The starter wheel should rotate away from you; if it doesn't, simply reverse the wires on the battery.

The final step is to adjust the height of the starter switch. If the switch isn't at a proper height, using the box will be much more difficult. Plop your car down on the starter box, and adjust the height of the starter switch. The switch should activate the starter motor about 3/16 to 1/4 inch before the flywheel comes in contact with the starter wheel. This way, the motor is up to speed before it makes contact with the engine. Once it has been positioned correctly, you're ready to race!!

I'm really glad I found the Pro-Start. It's very compact, very lightweight and exceptionally easy to put together. If a starter box isn't something you already have in your collection of R/C stuff, the Pro-Start is a great bet. It provides an easy way to keep your car roaring and to prevent your arms from getting sore!

**Addresses are listed alphabetically in the Index of Manufacturers on page 166.*



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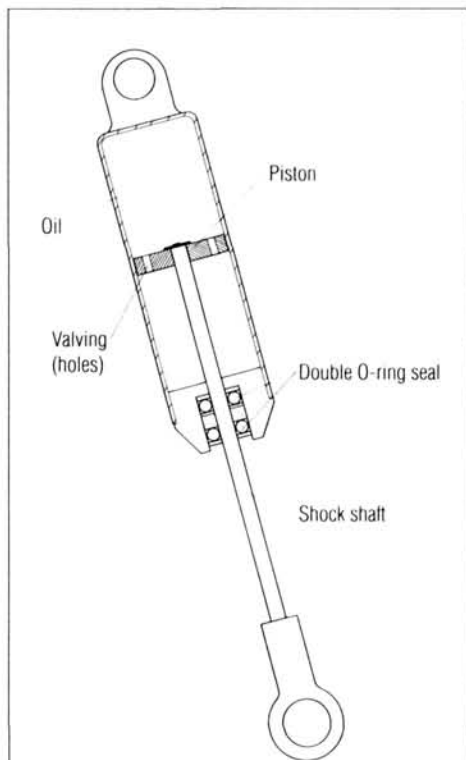
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TECH HEAD

by Frank Masi

Future Shocks

When we talk in terms of damping, what precisely do we mean? We probably refer to shock oil and pistons—a good beginning, but there's more to the subject. First, let's define the word "damper" as it relates to vehicles both R/C and full-size.



This orifice-type shock that's used on R/C models has a simple mono-tube design with a single-stage piston. Damping, which is approximately the same for compression and rebound, is altered by the size of the piston orifice and the thickness of the damper oil.

A damper is a device that's placed between a vehicle's chassis and its moving suspension parts. Through hydraulics and friction, the damper converts the kinetic energy (produced by motion) of the suspension movement into thermal energy (heat). By use of a damper, the chassis is mostly isolated from the suspension's kinetic energy and, thus, we get increased traction and propulsion and a smoother ride.

Now, for effective suspension, a damper must be used with a spring. Although they work together, the damper and spring perform distinctly different jobs. The spring (usually of the coil variety) is needed to support the "sprung" weight of the vehicle. (Sprung weight refers to the weight of that portion of the vehicle supported by the shock springs.) Unlike the damper, which absorbs kinetic energy and converts it into heat (which is then dissipated through the damper into the air), the spring stores kinetic energy on compression and releases it through rebound. Springs also aren't very good at absorbing vibration. By itself, the spring would resonate (vibrate) with each bump and, in turn, would transfer resonance to the chassis. Fortunately, dampers do an excellent



Rancho's new Lightning Rod race shock for full-size off-road vehicles is a state-of-the-art, position-sensitive damper. Depending on the piston's position in the shock cylinder, bypass valves and reserve oil chambers allow for four different damping "zones." Photo courtesy of Rancho Suspension.

job of absorbing vibration. They're also good at controlling the speed at which the spring compresses and rebounds, and in doing so, they help to control the speed at which the suspension operates. This is how the spring and damper work together.

To sum it up: the spring supports the vehicle's weight and helps absorb energy from bumps; the damper isolates the chassis from the action of the spring and suspension. Both the strength of the spring and the resistance of the damper control the suspension rate.

Shaft speed and pack

An important component of damper performance, especially in off-road, is shock-shaft speed. Shaft speed is directly related to the amount of force exerted on the shock by the suspension. In on-road, there's less suspension travel, and the running surface is usually very smooth. Because of this, the shock can have a short stroke (amount of piston travel), and it usually operates at lower shaft speeds.

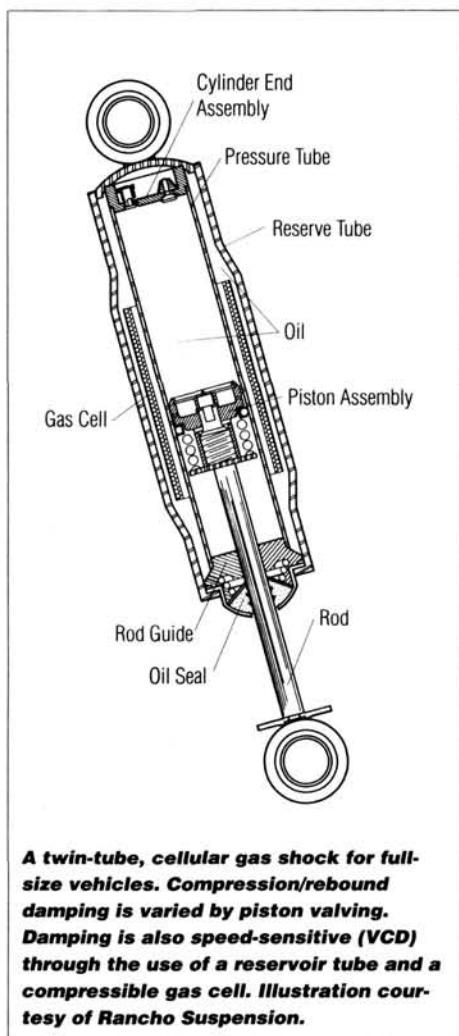
Off-road vehicles require lots of suspension travel to cope with bumps and jumps, so their shocks must have a long stroke. Off-road

shocks usually operate at very fast shaft speeds. Shaft speed is important because the speed at which the piston moves through the oil drastically changes the damping characteristics of the shock—at least in terms of R/C model shocks. (The larger full-size shocks allow engineers to address this problem more effectively.) The term "static damping" refers to how the shock "feels" at slow speeds, as when you operate it by hand. Actual on-track damping changes according to how quickly the shock is compressed.

As a general rule, faster shaft speed goes hand-in-hand with an increase in damping. This is where the term "pack" comes in. Pack is when the shaft speed exceeds the ability of the oil to flow through the piston effectively, a period of hydraulic "locking" takes place that prevents the shock from compressing. This period only lasts for a split second, but it's enough to cause the vehicle to bounce. To overcome unwanted pack, some experts recommend the use of larger-orifice pistons and perhaps a corresponding increase in oil thickness to maintain static damping. It's believed that this setup will delay the hydraulic lock to a higher shaft speed. With greater pack, however, the

shock will act as a hydraulic bump-stop, so the vehicle will be less likely to bottom out—a big problem with R/C off-road buggies. Incidentally, all shocks will exhibit pack, but for some, the shaft speed at which pack will occur is beyond the shaft speed experienced while the vehicle is running.

This type of pack should not be confused with the terms “packing” or “packing up,” both of which describe a state of excessive rebound damping. Under this condition, the shock is unable to rebound quickly enough to compensate for successive bumps, until finally, travel is used up and suspension action is nullified.



Variable damping: a solution?

Our common oil-filled dampers use a simple, orifice-type piston, which means that the damping is controlled solely by the size of the piston's openings (orifices) and the thickness of the damper oil. At a given shaft speed, these shocks compress and rebound at approximately the same rate, so if you want heavy compression damping, you'll have to settle for sluggish rebound damping. Ideally, we want enough compression damping to ensure that harsh bumps, large jumps and bumps taken at high speeds don't cause the suspension to bottom. At the same time, the shock must allow the vehicle's tires to conform to the terrain and to drop into holes in the surface. To achieve this and to avoid packing up, quick rebound is needed. Herein lies the problem: the best we can achieve using single-rate damping is a compromise.

Makers of full-size shocks have devised several interesting solutions to this puzzle: special pistons equipped with elaborate valves alter the damping of the shock depending on the piston's direction of travel (compression or rebound). Taking this a step further, some piston valving is sensitive to shaft speed, so damping is only altered at higher shaft speeds. This type of valving makes for damping that's controlled by velocity—kind of a “real world” shock.

Travel- or position-controlled damping is another nifty method of controlling shock rate. In this case, damping is determined by the piston's position within the shock body (“cylinder” in full-size terminology).

The cylinder is divided into “zones” by bypass valves that lead to oil reservoirs. As the piston travels through each zone, it encounters different levels of resistance. Some types of full-size racing shocks have more than four zones. Manufacturers may use one of these methods, or combine them to tailor the shock to a specific performance requirement.

What to change?

So if we could apply some full-size technology to R/C shocks, what would be more desirable: higher compression-to-rebound damping, or higher rebound-to-compression damping? Interestingly enough, two leading manufacturers of R/C racing cars express different opinions on this subject:

- One expert sides with the full-size camp and feels that more rebound damping is better for off-road. Because the spring stores compression energy, less compression damping is needed. But the damper must prevent the spring from rebounding too quickly and forcefully, so rebound damping must be increased.

- Another position states that dynamic compression forces are almost always greater than rebound forces, because in rebound, the main force working against the damper is the force of the spring. The exception to this rule is when the vehicle is at or near its normal ride height and shock-shaft speed is low, and the forces of compression and rebound may be equal. In short, compression damping should exceed rebound damping except at slower shaft speeds.

There are, however, a couple of glitches in this latter theory. First, tires

will absorb and store compression energy, which they will release as rebound. To manage this condition, additional rebound damping may be required. Also, size means everything! A small damper will function differently from a full-size one—even if they are mechanically identical. This complex situation has to do with the molecular structure of the materials used in the construction of the shock.

Unfortunately, our tiny shocks make the application of full-size technology a challenge. Some manufacturers have experimented with travel-controlled valving (TCV) and velocity-controlled damping (VCD), but these attempts have yet to bear fruit. One problem is the tolerances (the acceptable margin for size variations in manufacturing) of the shock's parts. Because our model shocks are so small, the slightest variation in parts translates into big changes in performance consistency. Paragon's* Jump-Jets were a type of TCV mechanism; they gradually decreased the size of the piston orifice as the shock was compressed. RPM* has recently released two-stage pistons for Associated* and Losi* shocks that provide separate compression/rebound rates. We plan a full test of these new pistons soon, so stay tuned.

Thanks to Cliff Lett of Associated Electrics, Jack Johnson of Team Losi and Don Ham of Rancho Suspension for their assistance in the completion of this column.

*Addresses are listed alphabetically in the Index of Manufacturers on page 166. ■

From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots

This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at Car Action really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035.

RACING



Josh Ames gets his Losi buggy ready to race on the stadium track.

CCR RACING

with the Jackson, MI, R.A.C.E. Club by Mike Myers

SUNDAY, February 12 was the day of the third race in the Jackson R.A.C.E. club's monthly five-race series held at Jackson Community College in Jackson, MI. The club has been running this series for many

tional 350 feet of 12-foot-wide, gray, Ozite carpet, and that was enough to make a full-size indoor replica of the Lake Whippoorwill track! This "short-track" oval was gigantic with a 215-foot center line. I'm scared to think of what

that provided a very, very wide track. It looked so wide that one might almost imagine a day of R/C racing without crashes. (Naw, that's impossible.)

The track was about twice as long as it was wide. Every corner was filled in with a triangular piece of shiny white Masonite™, which did an excellent job of marking the corners. The white stuff offered no traction, but it did allow the corners to be taken reasonably tightly. You didn't want to overdo it though; just inside the white stuff lurked the dreaded dots. Drivers who were unfortunate enough to hit the dots were lucky if all they did was bite chunks of rubber out of their tires. Less fortunate racers' cars "cartwheeled" across the track—not a nice way to treat a racecar!

The brand-new carpet provided yet another unique feature—ripples! I suppose I could more realistically call them "wrinkles," but whatever they were, you absolutely had to raise your car and your body high enough to go over them and not get battered by them.

the club will do for their giant oval in April. Maybe we had all better get longer antennas for our transmitters!

BUILDING THE TRACK

The race site (the Jackson Community College Field House) is about the size of a football field. Club member Joe Hamp designed the rectangular track layout. The inside was made with the new carpet. Another section of older carpet surrounded the new carpet, and

GETTING READY

More than 200 racers showed up to race in Pan Car,

Transmission, Truck, 1/2-Scale, Classic, Sprint Car and Unlimited Truck classes (modified and stock).

- **Classic.** The cars could use no more than 6 cells and had to use a 1960 body or older. Other than that, it was anything goes!
- **Unlimited Truck.** For this, there were no restrictions—any number of cells, any number of motors and so on. Some of the racers were very creative in coming up with powerful-looking race machines, but basic, stock trucks (with a couple more cells) usually ended up winning this class.

PRACTICE

Eventually, the racers were arranged into 25 qualifiers, most of which had 10 cars. The track opened for practice at around 8 a.m., and there were about 2 hours of practice time; sometimes it was wide-open, and at other times it was controlled



Only one lap into the race, anxiety on the drivers' stand mounts.

years, and they consistently attract between 200 and 300 racers.

Usually, the track is built on the preceding Saturday. There's practice on Saturday afternoon, and the races are held on Sunday.

The short-track-oval event was scheduled for Sunday. And it might have been exactly that, but a couple of weeks earlier, the club had bought an addi-

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If you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here's a few hot-line phone numbers that you can use if you have any questions, or if you'd like to start a program in your area.

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Kyosho R/C Sport Racing
(800) 682-8948, ext. 085F

Hobby Shack Parking Lot
(714) 964-8846

Hobby Town USA Parking Lot
(402) 434-5050

Trinity's Street SPEC Series
(908) 862-1705





An overhead view of the Jackson R.A.C.E. Club's short-oval track.

practice with just one type of car out on the track.

Open practice was like a major traffic jam, with all types and styles of vehicles on the track, and drivers at all levels of ability trying to share the space. Because you couldn't go fast (for long), the most useful function that open practice provided was as a radio test; if you didn't get glitches in this traffic, you knew you had a good radio setup. Fortunately, during the controlled practice sessions, the number of cars out on the track was reduced to 15 or so.

COST-CONTROLLED RACING

You might be wondering how a club race can consistently attract more than 200 racers while most tracks have trouble getting a fraction of that. There are several answers, but one of the big ones is cost-controlled racing (CCR).

• **Weekly races.** For the past few years, the club has set up weekly races at a local school. This year, however, all the inexpensive places were already spoken for. Unable to find an inexpensive indoor race site, the club decided that, if they couldn't hold races that kids could enter for about \$5, they wouldn't hold any weekly races at all that winter.

• **Monthly races.** The CCR attitude also applies to the big monthly races. The entry fee is only \$10, which is inexpensive for a trophy race. Also, to keep costs down, the club adopted a

"handout motor system". Club member Ken Hamilton volunteered to handle the stock motors for the entire five-race season. Racers who wanted to run in the stock class paid \$15 for a Race Prep* stock motor. The motor was engraved with the racer's number and the class for which the motor was purchased. The club rules that racers can use their one stock motor in any or all of the club's indoor events, provided that the motor is handed in at the end of the day. To keep the motors running at their best, comm cutting is allowed, and there's usually a club member who will cut other racer's armatures for 3 bucks.

• **Plaques.** CCR also applies to the plaques that are handed out in each Main. Although there are some people who have expensive, fancy cars with high-tech support equipment, the majority of the racers are just out for fun; they race the same car that they put off-road tires on when the temperature is more civilized.

In most classes, to win the A-Main, you need both ability and good equipment. Racers with less expensive equipment usually qualify for the B- or C-Mains. So, to give the C-Main winner just as much credit as the A-Main winner for having won in the class, all the first-place plaques are the same size, all the second-place plaques are a little smaller, and all the third-place plaques are smaller still. Every racer has a shot at winning a number-one plaque.

ADDED ATTRACTIONS

The club also does other things to make the races more enjoyable. Because they race all day, the club invites food vendors to

sell donuts and coffee in the morning and hot dogs and other tasty goodies the rest of the day.

The field house is really huge with lots of pit space. Electricity is provided, but racers bring their own tables, chairs and extension chords. One wall of the field house has a long row of collapsible bleachers. One of the rows is marked for drivers and is used as the drivers' stand. It's high enough to give an excellent view of the track.

THE RACE

This weekend, as usual, the racing started right on schedule at 10 a.m. First up was the 1/12-Scale class, and it was followed by Indy, Classic, Stock Trucks, Nastruck, Pan Stock, Sprint Cars, Transmission Modified, Pan Modified, Sprint Cars, Modified Trucks and finally Unlimited Truck. Two rounds of qualifiers were run, after which there was a 20-minute break.

The Mains started late in the afternoon and went very smoothly. I noticed only a few

unlucky incidents. Fortunately, because there were so many racers, the other 99 percent who didn't crash put on a good show for everyone to watch, and everyone had a great time.

A compliment and a "That's how it's done!" goes to Jim "The Old Guy" Kirkland. Jim had the no. 2 car in the 1/12-Scale A-Main and was way out in the lead. I was up in the stands taking photographs, and I watched Jim as he continually put his car in a "safe" spot on the track, even while passing other cars. Long before he came up on cars he needed to pass, he would adjust his position on the track to allow a nice "cushion" of space between his car and the other cars. I complimented him later on the best defensive driving I had ever seen. It's too bad everyone didn't get to see this from way up high, because down at track level, it might not have been as apparent.

The last race of the day finished around 9 p.m., at which time the plaques were handed out. The club members packed the rolls of carpet, computer stuff and other race goodies into several vans and trailers.

The Giant Stadium Race on March 12 was next, followed by the Giant Oval race in April. This is truly some spectacular racing!

*Addresses are listed alphabetically in the Index of Manufacturers on page 166.

Turn marshalling on the coliseum ramp.



The Classic Car class at the short-oval track.

INDEX OF MANUFACTURERS

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Advanced Design Concepts; see Composite Craft.

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Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9400; fax (909) 590-1496.

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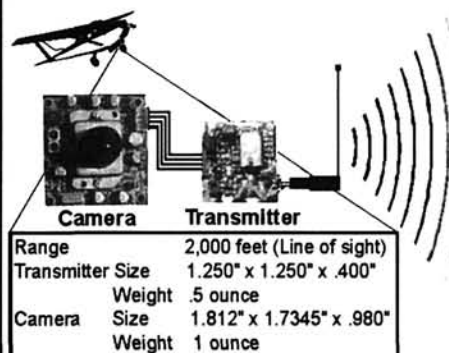
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CHRIS'

BACK LOT

This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897.

by Chris Chianelli

The other day, looking through some old photo files, I came across a lot of pictures of some pretty old R/C cars that I think you'd all like to take a peek at.

Some are so old that those who are relative newcomers to the hobby probably won't have seen them before—possibly, might never even have heard of them. Yes, they look like pretty wild rides, and some were pretty wild to drive, too! But they were, without a doubt, the "Model Ts" of R/C, so have some respect.

After looking through all those old photos, I must admit that R/C cars have come a long way.

Anyway, here's the deal: if you consider yourself an R/C aficionado, it's time to test your knowledge. If you're the first to identify all the cars correctly, you'll win a two-year subscription to your favorite mag; that's right! Radio Control Car Action—FREE!—for two years! We might toss a few extra goodies your way, too!



BLAST FROM
THE PAST

contest



The first person to identify all the cars correctly will be da winnah! So don't delay; get those brain wheels turnin'. If no one identifies all of them, we'll pick the reader who correctly identifies the most. In the event of a tie, we'll put the names into a hat and pick one out.

We must receive your entry by June 30, 1995.

Address your entry to:

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GOOD LUCK!